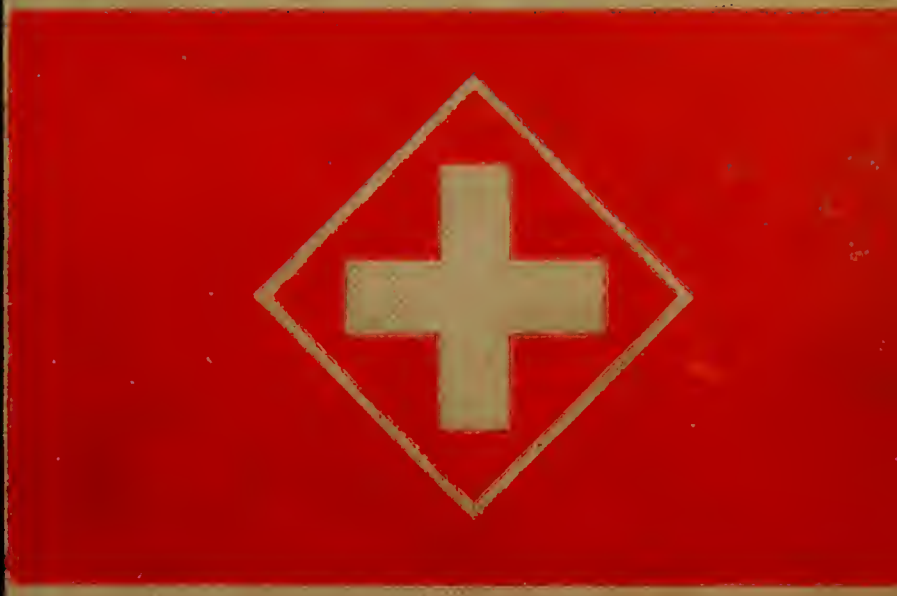
PERSONAL HYGIENE



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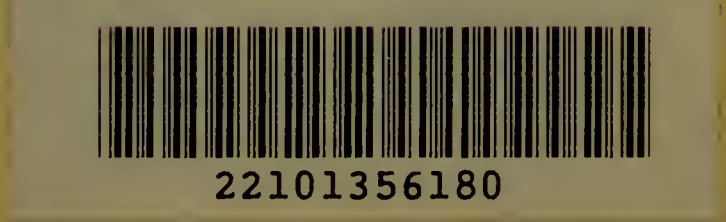

PERSONAL HYGIENE

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BY

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EDITOR OF "BABY: THE MOTHERS' MAGAZINE"

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TO

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I DEDICATE THIS WORK

And in so doing, I am glad of the opportunity it affords me of testifying my gratitude to the man through whose instrumentality I started ten years ago on a career as a health reformer, in which I have reason to believe I have met with considerable success. I trust that in perusing the following pages he may find that I have not forgotten the principles he inculcated during my student days.

ADA S. BALLIN.

PREFACE

I HAVE been asked by the publisher of the Sanitary Series to accomplish a rather difficult task, namely, to write a treatise on Personal Health, which shall be comprehensive and sufficiently technical to render it a useful handbook for students and medical men, while not too technical to be of service to the general public. I hope that in the endeavour to please both classes, I shall not fail to give satisfaction to either; but as medical readers will not lose by perusing facts which are familiar to them, and it would be a distinct loss to general readers if those facts were omitted, I trust that I shall be excused if I have rather inclined towards making a simple, practical, and non-technical explanation of the laws of health. Wherever necessary to illustrate these laws, I have first dealt with the physiology of the subject. I trust that the little work may do something towards promoting the study of that science, which is most calculated to improve the condition of the human race.

ADA S. BALLIN.

4 BOYNE TERRACE, HOLLAND PARK,
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PERSONAL HYGIENE

CHAPTER I

INTRODUCTORY

"LIFE is not to live, but to be well," as Martial has said, and what knowledge can be of more use than that which teaches how to live well? This knowledge we can obtain by a study of simple laws which have been grouped together under the name of **Hygiene**. "Hygiene," said Parkes, one of the first of modern teachers on the subject, "is the art of preserving health: it signifies perfect culture of mind and body, and aims at rendering growth more perfect, life more vigorous, and death more remote." Let us hope that a time will come, and come soon too, when this art shall be the common property of every one, when it shall be thought as much a disgrace to be ignorant of its principles as to neglect the first principles of morality; but although we hear much talk of the subject every day, a considerable absence of knowledge is often hidden under many words, and even when theoretical knowledge has been acquired it is very frequently never carried into practice. In point of fact the houses of medical men are often far less sanitary than those of their more ignorant neighbours, and a surveyor recently told me that the very worst drained building he had ever been called upon to inspect was the home of one of the most influential of English medical societies; while I heard one of our first physicians confess that his prolonged

illness from diphtheria was due to his sleeping in a room the walls of which were richly upholstered, thus affording lodgments for the disease germs. When removed to a room with bare walls he rapidly improved. Another eminent surgeon of my acquaintance nearly lost his wife from typhoid, contracted through the disgraceful state of the drainage of their house. I could multiply these instances *ad infinitum;* but enough has been said to show that even the men who should pay most attention to the laws of health are apt to lull themselves into a false security. Equally with their less educated neighbours they should, however, safeguard themselves against the inroads of disease, and take to heart that trite old saying, the truth of which is never sufficiently appreciated, that "Prevention is better than cure."

The well-known sanitarian, the late Professor De Chaumont, has said that half the number of persons who die could be saved by the exercise of proper sanitary precautions. Great epidemics, by causing a panic, give rise to a perfect fever of sanitary enthusiasm, but as they die out the enthusiasm dies out too, and things are left very little better than they were before, until the next crisis develops. Meanwhile, the victims of ignorance and unconcern quietly go on dropping out of existence and make no sign, or at any rate none that is heeded. Thus, 35,000 persons perished in the last great cholera epidemic; Europe was agitated; the press for months teemed with reports, suggestions, theories, and health sermons, and wildly urged the adoption of precautions, the necessity for which ought never to have arisen. In that very same year no less than 40,000 persons died of typhoid fever, but these cases, though having their origin in the same neglect of sanitation, cleanliness, and personal health, attracted no attention whatever, nor any desire to ameliorate matters; and so these fatalities, which, if people would but acknowledge it, are absolutely preventable, go on from year to year.

The science of health is by no means new, for quite two-

thirds of the Books of Moses are devoted to it; but during the Middle Ages the Books of Moses, with those of the Roman physicians, Hippocrates, Celsus, and Galen, were unstudied, and an idea prevailed—owing to the monastic tendency of the times, which looked upon the body as an unworthy shrine of the soul—that care of the person was unnecessary, if not sinful. Had it not been for this, the devastating plagues of the Middle Ages, of which we read even now with a shudder of horror, would never have come about; for the Jews, who were always diligent students of their own Book, and strict adherents to its laws, were so exempt from these plagues that they were accused of having caused them by witchcraft, or by poisoning the wells.

Of "the many ills that flesh is heir to," most are brought about by our own faults or folly, and that diseases are preventable, and not dispensations of Providence which must be borne uncomplainingly, is daily becoming more widely acknowledged. We know now that if we drain a marshy country, marsh diseases, such as ague and the like, disappear; whereas, if we allow a once fertile and healthy country to go to ruin in respect of drainage, they appear. Thus the Catania, south of Etna, in Sicily, has by neglect become a hot-bed of disease, and Lower Egypt, which under the Pharaohs was very fertile, has become a pestilential swamp. Consumption, which is the great scourge of our country, is now being brought under control by the knowledge that it is favoured by damp, one of its chief causes being the too near approach of subsoil water to houses. Wherever, by proper drainage, the level of the subsoil water has been lowered, the death-rate from consumption has decreased. Thus, in the town of Salisbury it has been lowered to one-half, and in many towns as much as one-third. Among the other causes of consumption are bad food, bad clothing, bad air, and bad ventilation, all of which causes are, of course, removable.

Typhus or gaol fever is rapidly becoming an extinct disease, owing to the knowledge that it is caused only by

filth and overcrowding; and by improvements in drainage we are doing much to root out that disease with which it was formerly confused, viz., typhoid or enteric fever,—which, although also a filth-disease, is quite distinct from typhus.

As far as contagious diseases are concerned, their spread may be limited by the isolation of patients and the proper use of disinfectants, of which I shall speak in due course; and diseases of the lungs, colds, bronchitis, etc., are greatly lessened by due attention to the heating and ventilation of houses, with which I shall also deal.

During the first thirty-three years of civil registration the English death-rate was practically stationary at 22·4 per 1000. In the years 1876 to 1880 it declined to 20·8; from 1880 to 1884 it fell to 19·4, and there has been no increase since then. This improvement in public health is directly traceable to the improvement in sanitary knowledge, and the action based thereupon. The Public Health Acts of 1872 and 1875 may be presumed to have come into full action in 1876.

A very striking example of the saving in health and life due to attention to the laws of health may be taken from the annals of our army. Not so many years ago to live in barracks at home was far more fatal than to risk the dangers of war. It must be remembered that our soldiers are selected from among the healthiest men, and are at ages when the fewest deaths occur, yet thirty-five years ago the death-rate of our soldiers was 18 per 1000, this enormous rate being maintained almost entirely owing to bad ventilation, bad drainage, and overcrowding. Now that special attention is given to the sanitary arrangements of barracks, the death-rate has decreased to about one-third—or, to be more exact, 6·28 per 1000. Formerly more men died of the one disease—consumption—than now die from all causes.

There are every year about 750,000 deaths in the United Kingdom; and with regard to these a curious calculation has been made from an economic point of view. Half of

all the deaths are of children, or persons in the unproductive periods of life—that is to say, incapable of earning a living. Of the remainder, nearly one-third are deaths from preventable causes; and reckoning a premature death at a loss to the State of £100, Professor De Chaumont calculated that £25,000,000 per annum (nearly as much as the interest on the National Debt) might be saved by due attention to the laws of health.

A diminished death-rate means more than a certain number of lives prolonged—it implies fewer cases of illness, a decrease of suffering and sorrow, and the increased happiness which comes with health. By spreading health-knowledge among the people life is saved, disease warded off, poverty lessened, and temperance increased; for the habit of drinking is frequently first induced by a feeling of weakness and debility, which leads to a craving for stimulants. It is a matter for congratulation that health science is now largely taught and practised by women; that women are going about among the people as apostles of health, teaching them how to be well and happy, and that this movement is gaining impetus every day. "Oh, yes," my readers may say; "that is doubtless all very true; but not all women can frequent the shrines as missionaries of the goddess Hygeia." Certainly not; not every woman is suited, or can have the opportunity, to do so; but yet, by attention to herself, her children, and her home, she can work in the good cause. Let her make her own house a temple of the goddess, and she will have done her duty.

When a sanitary reformer comes and gives a lecture on drainage or ventilation, or some kindred subject, and, as is usual, cites a number of terrible examples, many among his audience very frequently refuse to be at all impressed, and maintain that they have seen these things going on all their lives and have not known any harm to come therefrom. Speaking of this very matter the other day, I heard a well-known sanitarian quote the story of an old gentleman of his

acquaintance, who for fifteen years drove every Sunday twice through a certain toll-gate on his way to and from church, and never once did he miss seeing the toll-keeper standing ready to receive his fee. One day, thinking to read a moral lesson, the old gentleman asked him, "Do you never go to a place of worship?" "Oh, no, my lord," answered the toll-man blithely; "I am in perfectly good health; thank you kindly, sir!" But sooner or later the blow is sure to fall, and no right-minded man or woman ought to be content to wait till death or disease is actually in the house before setting about to reform matters. When the blow falls, there is, alas! very little to be done, save to bewail one's past ignorance, apathy, or obstinacy.

The essentials conducive to health which it is necessary to consider are pure air, sunlight, freedom from damp and climatic extremes, pure water, good food, cleanliness, proper clothing, exercise and rest, and with all these matters I shall deal in the following chapters, briefly describing such points of physiology as may lead to the better understanding of each subject.

As in our present civilisation a house is a necessary evil, the influence of which is felt from the moment of birth or even before—as insanitary conditions of the mother's home affect the unborn child—I will begin by referring to some of the most important details regarding the choice of a residence.

CHAPTER II

IN AND ABOUT THE HOME

Where shall my House be?

When we have to choose a house in which we hope to settle down for a number of years, perhaps for the term of our natural lives, the first question to decide is: "Where shall it be?" Of course this question is very often practically answered by the necessities of business, or by wishing to live in the midst of friends; but if the world lies all before us where to choose, and especially if there are little children to be brought up, a country home is preferable to one in any great town, for, other things equal, the death-rate in the country is far lower than that in towns, owing chiefly to the superior purity of the air. The chief points in choosing an abode are that the water-supply should be good and uncontaminated—as I shall indicate later when dealing with water-supply—that an approved system of drainage should be adopted, and that the house should not be in the immediate vicinity of ponds, sluggish water, or shrubberies, or have trees growing quite close to it, as all these things tend to render the air damp, impure, and liable to fogs. A dry, elevated site, sheltered from cold winds, is the best. All hollows or low-lying localities, where water is likely to lodge, and the neighbourhood of marshes, should especially be avoided. Rising ground, or the slope of a hill with trees near, but not so near as to prevent the free circulation of air

round the house, should be chosen. The aspect for the house will doubtless be influenced greatly by the surrounding landscape, as people usually prefer to have the best view from their front windows; but a south-east aspect is preferable, so that the front rooms may be brightened by the morning sun, and the back rooms by the evening sun. When the house faces directly south, the front rooms are overheated in summer, and the back rooms are dark, dismal, and unhealthy, for, as an Italian proverb well says, "Where the sun does not go, the doctor does go." In a country-house there is more choice of aspect than in town, for most of the streets in our towns, unfortunately, lie due north and south, or due east and west, so that for our living rooms we are generally forced to choose between a sunless aspect and one which during summer is excessively hot, since the sun falls on it for the greater part of the day. The habitual occupation of rooms looking due north is decidedly depressing, and great advantages would accrue from a diagonal arrangement of streets—north-east and south-west, north-west and south-east.

If business or pleasure necessitates a home within easy access to the interior of a town, the suburbs, especially those built on rising ground, are far preferable, from a health point of view, to a residence in the actual centre of the town; but if the latter is necessary, a dwelling should be chosen in a wide street—a square, terrace, or avenue, and always on the sunniest side of the way. A detached house is preferable to one semi-detached, as allowing free circulation of air, and a semi-detached house is, for the same reason, preferable to one in a street or row. Narrow streets and houses built closely back to back should be avoided as far as possible, and if a garden or open space can be obtained, behind or in front, so much the better.

In a closely-inhabited neighbourhood it is especially important to be as near the top of a slope or rising ground as possible, or, at any rate, not near the bottom, as persons living at the lower level are very apt to suffer from an

accumulation of the sewage products from the upper houses, and soakage damp, which gravitate down to them.

In choosing a house or a site for building, its position as regards convenience of approach, or fashion of neighbourhood, ought to be a less consideration than its health aspect, especially with regard to its elevation and dryness of soil.

Soils

Moisture arising from the soil has a very injurious effect upon the health. The more moisture retained in a soil for evaporation, the less healthy is a house built upon that soil, so that the most healthy soil is that through which most moisture can percolate, leaving little for evaporation.

I cannot insist too strongly upon the dangers of a damp locality, and I will here quote a few statistics which show the actual decrease in the death-rate by consumption, brought about by improved subsoil drainage. At Salisbury this decrease was 49 per cent; at Ely, 47; at Rugby, 43; and at Banbury, 14, while a marked reduction was effected in the case of thirteen other towns. During the same period in Alnwick, Norwich, and Stafford, where no improvements had been effected in subsoil drainage, the death-rate from consumption remained stationary, although many other sanitary improvements had been made. Again, at Penzance, where the subsoil is naturally dry, the consumption death-rate was stationary, and no decrease was effected at Carlisle, because the attempts at subsoil drainage were frustrated by the low-lying condition of the district, where damp reigns supreme. Yet serious as is the consideration of the mortality from consumption in England, it must not be supposed that only this disease is affected by dampness of soil—for diseases of the throat and lungs, and rheumatism, with its attendant heart-disease, are also affected by it. Recent inquiries have shown, moreover, that it influences the fatality of acute specific diseases; thus Dr. Blaxall has shown that in Swindon there was

twice the proportion of deaths from measles, whooping-cough, pneumonia, and bronchitis in that part of the town which is built on Kimmeridge clay, as there was in another part of the town which is situated 100 feet higher on oolitic limestone and Portland sand. Free intercourse took place between both parts of the town, and there seemed nothing to account for the difference in the death-rate but the dampness of the lower part, and the want of due precautions in order to prevent that dampness from rising into the houses.

There are many different soils, or, as the geologists call them, rocks, but as far as we are concerned they may be divided into two classes :—

1. **Pervious Soils**, that permit water to pass through them, and which, arranged in their order according to the degree of perviousness, are gravel, sand, and some sandstones, chalk, by reason of its fissures, and loose rocks generally.
2. **Impervious Soils**, such as clay, many marls, hard limestones, granite, and a variety of others.

On pervious soils typhoid fever and cholera may arise by wells becoming poisoned owing to soakage into them of drainage from cesspools or cattle-sheds; but if such contamination is guarded against by a careful system of drainage, or if water is obtained from an unquestionable source, this danger is obviated; and a pervious soil is decidedly the best for sanitary reasons, for with a pervious soil the level of the subsoil water is generally low and can easily be lowered, whereas with an impervious soil, subsoil water is apt to collect in great quantities, and its removal is very difficult. Hence upon impervious soils rheumatic complaints, lung diseases, especially consumption and bronchitis, scrofulous diseases, and, in fact, all ailments which are encouraged by damp and putrefaction, flourish exceedingly.

The following illustration (Fig. 1) shows more clearly than words can do the relative value of a healthy and unhealthy soil. In high situations a clay soil is found not to be so

objectionable, as it is said to retain about the same percentage of moisture as chalk, and to possess great deodorising powers. In low situations clay soil should be drained by trenches with earthenware pipes laid at the bottom, filled in with pebbles to allow of percolation. As clay expands and contracts with varying conditions of moisture, it forms a very bad foundation for houses, and on all clay soils artificial foundations of concrete should be employed. The most healthy soil is a gravel or sand soil.

A. Gravel. FIG. 1. B. Clay.

Even when the natural soil of a neighbourhood is all that can be desired, it is necessary to be on one's guard against the wiles of the jerry-builder, since that depraved individual has been known to remove the sand or gravel, which is a saleable commodity, and fill in the site with moist earth, road scourings, and the recent contents of dust-bins, amid which has been found decaying vegetable and animal matter. Another danger is that of a disused cesspool—a relic of some former building which may be buried beneath the site of the new house, and continue for years to give off poisonous gases, and cause mysterious complaints and diseases among its inhabitants.

A serious danger accrues from the building of houses over hidden water. Even in the most fashionable parts of London this is not unknown. In one case I was told by a medical friend, where illness in the family led to investigations in the

basement, a stagnant and stinking pond was found beneath the pantry floor. It had been observed that each new servant who used the room suffered with his throat. In other still worse cases disused cesspools have been built over, and an instance occurred a year or two back in the house of a gentleman living not very far from Park Lane, who lost one of his children by typhoid fever. This led to an investigation of the drains, and at last a cesspool containing fœtid matter was discovered just under the kitchen floor.

Old brick-barrelled drains beneath the house are another source of danger, for, as in the former cases, the foul air which they contain is apt to filter through the joints and brickwork into the house.

The neighbourhood of burial-grounds should be carefully avoided, especially in localities where the water is drawn from wells.

Forty years ago Dr. Reid found that the air in the Houses of Parliament was contaminated by the neighbourhood of St. Margaret's burial-ground, and a report of the French Academy of Medicine has stated that the emanations from Père La Chaise, Montmartre, and Mont Parnasse have caused terrible diseases of the throat and lungs, to which numbers of people fall victims every year. Boards of Works, and authorities who have to do with the construction of houses, are lamentably to blame in their negligence with regard to burial-grounds, and until the consummation devoutly to be wished—universal cremation of the dead—is firmly established, thousands will fall victims every year to diseases propagated out of a false idea of what is due to the loved ones who have gone before us. For the present we can, as individuals, only take such steps as lie within our power to avoid danger from this source.

The Basement

The best means of avoiding or obviating dangers from the soil is to cover the whole site with a six-inch layer of con-

crete, which ought always to be laid, whatever the nature of the soil, although the Metropolitan Management Act of 1878 only enforces it with regard to sites not consisting of gravel, sand, or natural virgin soil. Good Portland cement concrete, with an aggregate of broken brick, burnt ballast, or well-washed coarse sharp gravel, and a mixing of lime and gritty sand, *not dust*, is the best, and the concrete, instead of being thrown from a height, should be laid at the level and well rammed in to make it firm and even. In inspecting a house a board should be removed from one of the basement floors to see whether such a concrete foundation has been laid. It is best that the foundation of the house should be as little as possible below the level of the ground; but if the foundation is sunk the basement should be used only for kitchens, offices, and cellars, and not in any way as living rooms. The widely-spread practice in small houses of making a "breakfast-room" on the basement—a room partially or wholly below the level of the soil, in which the mistress of the house sits nearly all day, is most injurious to health, depriving her of proper air and light, and often exposing her to damp exhalations, which come through the walls, even if there is a damp-proof foundation. Still worse is it to use such a room as a playroom for the children, or bedroom for the servants, and I have seen much ill-health in servants caused by sleeping in an underground room.

It is best, if possible, to have a cellarage under the lowest inhabited rooms of a house, as this conduces to dryness and health; but the cellars should be easily accessible, so as to keep them clean, and should have impervious flooring.

Walls

Brick, stone, or concrete walls are all more or less pervious to damp, a great deal of which in moist situations, or when the walls are much exposed to driving rain, will pass through them in a vaporous form, induced by the heat

of the rooms. During the night, when the rooms cool, the damp becomes condensed, is again rendered vaporous by the heat next day, and saturates the air of the house. Thus many rooms are always damp during certain seasons of the year.

In walls partly or wholly beneath the ground, moisture from the earth soaks through at the side, and also rises in the wall by capillary attraction. The best surface to expose to the earth or to driving rain is a glazed brick surface jointed and pointed with cement. To prevent ground or side soakage from the soil into a wall, the best plan is to have what is called a dry area—that is to say, to have a space left between the main wall and a thin outer wall all round the house joining the two by stretched bricks. This should be drained, ventilated, so as to prevent dry rot, and covered in so that rain may not fall into it. When no such area can be made the wall should be thickly coated with asphalt. Such precautions from the outside are far better than any from the inside; but in cases where they are unavailable, and damp is found to exude from and be reabsorbed into a wall, either of the following plans may be adopted for the inside:— Dissolve three-quarters of a pound of mottled soap in a gallon of water, and apply it hot to the surface with a large whitewasher's brush, being careful not to let it lather. When it is dry, next day, apply a solution of half a pound of alum in four gallons of water, all over the surface. One or two coats of boiled oil applied to the surface have been found effectual, or a more complicated plan is to prepare one pound of finely-powdered glass, and two pounds of slaked lime well dried in an iron pot, and passed through an iron sieve. Boil two ounces of grease with two quarts of tar for nearly twenty minutes, then add some of the lime to the tar and glass to form a thin paste, using at a time only sufficient to cover one square foot of the surface an eighth of an inch thick, and then adding lime again for the next piece of wall, and so on. This coating is more durable than the former, but all require

occasional renewal; they are more effectual than mere painting. Adamant cement is even better.

I have said that walls absorb a considerable amount of moisture when exposed to rain or damp, and this is especially true of brick walls, some bricks being so soft and porous that a single brick will absorb as much as a pound of water, acting just like a sponge. The thickness of walls, of course, varies according to their height, but the importance of having substantial walls is not merely to serve as a support for the weight above, but to maintain an even temperature during varying seasons, protecting the interior alike from heat and cold, by their action as non-conductors of heat, and also to keep out damp. Where walls are much exposed to driving rain various expedients have been resorted to, to prevent damp. Concrete walls, or brick walls faced with concrete, are tolerably effective, but a glazed brick surface jointed and pointed with cement or coats of waterproof silicate composition as before described are more effective. Tiles or slates are sometimes used, but are not nearly so efficient; if used, they should be fixed with zinc, copper, or galvanised iron nails, as the rusting of ordinary nails would cause them to fall away.

The old Romans were evidently quite familiar with the upward and downward soakage in brick walls, for it is a characteristic of all Roman walls that at regular intervals in the brickwork flat red slates are introduced, evidently with the object of interrupting the soakage by capillary attraction. A further development of this idea is the damp-proof course, which should be introduced into all outer walls at a level of about a foot above the surface of the ground. Such a course may be made of asphalt, stoneware, or slate laid in cement, a double course of plain tiles laid in cement, which are less liable to break than slates, or sheet lead. Portland cement is often used, but this is liable to crack.

To exclude damp from houses by building double walls is

an old expedient which was tried, but not found very successful, in the Temple of the Vestal Virgins at Rome, which was built against a hill, so that damp filtered through the outer walls and caused a high mortality and large sick-list among the holy maidens, who, unfortunately for the romance which shrouds them, suffered much from colds in the head and rheumatism.

But as we do not now build houses right against the sides of hills, a hollow wall serves effectually to exclude damp, the main wall being best protected by an outer shell of glazed brick or stone work, five or six inches thick, fixed at a distance of about two inches by galvanised iron clamps. In fact, it would be a good plan to build all the outer walls of a new house hollow, with binding bricks, having glazed surfaces, so as not to conduct moisture, at regular intervals, in order to give the double walls the strength and stability of a substantial single one. Owing to the air contained between such walls, they act far better as non-conductors of heat than any single wall could do. Ventilating bricks should be inserted here and there, and the necessity for ventilation is greater in proportion as the outer walls are less pervious, for it must be remembered that air passes through bricks and other pervious materials, and is necessary to the health of the inhabitants. Impervious outer walls not only prevent the entrance of moisture into the house, but also hinder the exit of such moisture as always collects in the inner portions of walls, from the breath of the inhabitants, the steam of cooking, etc. They prevent evaporation by arresting the exchange of inside and outer air. Hence the best walls are the double ones just described, as, being porous, they are more readily cleared of moisture. Walls below the level of the damp-proof course, described above, should always be rendered impervious; but except in very damp districts there is no necessity for the upper walls to be so. Those on the inside should not be thickly painted or varnished over,—ordinary plastering does not make them impermeable, but

where they are coated with an impervious material on the inside there is increased need of proper ventilation.

Old Houses

In building a new house, it is of course possible to pay attention to all sanitary details; but in redecorating an old one it is also possible to do a great deal, as, for example, the drainage may be remodelled and a damp-proof course inserted. If one cannot build for oneself and wait for the house to thoroughly dry, it is best to rent one that has already been occupied, as new houses are generally damp, and it is said to take three years to dry a house thoroughly. Never choose a house in a hurry; it should be carefully and most minutely inspected and tested. I have known some women decide upon taking a lease of a house in less time than others would take to choose a new dress, but such things done in haste are generally repented of at leisure.

If people would only, in choosing a house, pay more attention to its real value and construction from the point of view of health, and less to its mere outward show and appearance, the actual saving in life and in health would be vastly increased. As it is, the jerry-builder knows that as long as he puts a good face upon matters, giving an imposing frontage and effective internal decoration, his houses are sure to let,—never mind if they are based on a soil made from road sweepings and dust and refuse of all kinds, if the chimneys smoke, the roof leaks, and the bath in the smart-looking bathroom communicates directly with the main drain, and is a perfect contrivance for admitting typhoid fever and diphtheria into the house.

Going over the New House

If possible, a competent surveyor, specially skilled in sanitary science, should be engaged to go over the house;

but the tenant himself should accompany him on his rounds, and should keep his eyes open to detect any faults or flaws.

Beginning with the roof, the pointing of all the brickwork in stacks and parapets should first be examined, a little stick being used to poke at it, in order to see that it will not crumble away. Then the bedding and jointing of the copings, and the condition of the lead flashings and gutters, should be tested, as well as the tiles and roof covering, so as to discover whether there is sufficient protection against rain, snow, wind, and changes of temperature; whether proper rain-pipes and arrangements for carrying off water are provided, and whether the skylights are water-tight. It is also as well to see that there is proper means of escape by the roof in case of fire; that the chimney-pots are in good working order; and, if there is a drain ventilating-pipe running up the side of the house, that it is carried sufficiently far up so that the foul air from it may not enter the upper bedrooms and skylights. The position of the rain-pipes should be noted, as, if they open anywhere near the windows or air inlets of the house, it is most necessary to ascertain on coming to the ground that they are properly disconnected from the drains. The spaces beneath the roof should be well ventilated, as impure air, which, when heated, rises, is very apt to collect in them.

Coming down into the house, we should note whether the plaster of the ceilings and walls is free from cracks, and whether the walls have been newly stripped and repapered or coloured, for sometimes it will be found that as many as four or five layers of paper have been left on the walls, each of which may exhale poisonous matters and impurities absorbed during the tenancy of past occupiers—nay, even the germs of diphtheria and scarlet fever. Next, notice whether the setting of the fire-grates is free from cracks, and by lighting some brown paper or a little fire in each grate, make sure that you will not have to endure the curse of a smoky chimney. The

hanging of the window-sashes and doors, and the condition of the woodwork and joiners' work generally, should next be examined; and it is wise to be very much on one's guard in new houses against the use of unseasoned wood, which may be made to look very well, but which soon warps, with the result that windows and doors will not open, and "stick," requiring constant attention, and becoming provocative of a tendency to profanity. The locks of the doors should be tried, and all defects of whatever kind should be jotted down systematically as one goes from room to room, in a new note-book, specifications made from which can, if the house proves sufficiently satisfactory, be placed in the landlord's hands, so that he may put everything in proper order before the tenancy is entered upon. The arrangements for ventilation, warming, and drainage, of course, need special attention; but of these I must speak more in detail later on.

Coming to the lower part of the house, it is well to enter the rooms after they have been shut up for some hours, in order to detect whether there is stuffiness, mustiness, or any other unpleasant smell, the origin of which, if it exists, must of course be inquired into. Against damp, as I have shown, we must be especially on our guard; and this cannot always be detected at first sight. Walls covered with battening and canvas should arouse suspicion, as they may conceal the presence of damp without in the least protecting from it. Fires should be lighted in the lower rooms and allowed to burn for an hour or so, with all windows and doors shut; very often beads of damp may then be seen to stand out upon the walls; but it is generally best to take a little hand-mirror with you, and wipe it carefully with a handkerchief in each room after the fires have drawn; it quickly becomes misty if the room is damp.

Staircases should always be well lighted and ventilated, sash-windows being the most suitable for them. A well-staircase, carried the whole height of the house, with a skylight and ventilator at the top, affords the best means of lighting

and ventilating side corridors and lobbies. Ordinary staircases should be built against an external wall, so that there can be a window at every half-pace landing. In inspecting the basement and outer walls due attention must be paid to the points I have noted above.

CHAPTER III

THE AIR WE BREATHE

The Lungs

Before considering the question, what we breathe, it is best to gain some idea of the mechanism of breathing. The organs concerned in breathing are the nose, mouth, larynx or organ of voice, the trachea or windpipe, and the bronchi or tubes by which air is conveyed into a number of tiny sacs which are called vesicles, each of which is surrounded by a network of fine blood-vessels called capillaries, the endings of the minute subdivisions of the pulmonary artery, which brings the blood from the heart.

The windpipe consists of from sixteen to twenty half-hoops of cartilage, which may be felt in the front of the throat. They are united by a tough fibrous tissue, which is elastic, and the back of the trachea is formed of similar tissue. The object of the half-hoops is to keep the tube constantly open, while the softness of the back part of the tube prevents injurious pressure on the œsophagus or gullet, which is placed immediately behind the windpipe. The windpipe extends till just below the top of the breast bone, where it divides into two smaller pipes or bronchi, the structure of which is similar to its own. These are about two inches and a half long, and then divide into two tubes nearly equal in size. From these the division of tubes goes on in pairs, and the smaller tubes extend like the branches of some trees, and

never reunite. The smallest branches, or, as they are called, terminal bronchi, have no cartilaginous hoops, but are more richly supplied with involuntary muscular fibres. These open into wider tubular passages, called alveolar passages, around which the air-cells are formed in clusters. Each air-cell is somewhat rounded in shape, and consists of a fine membrane surrounded by fibres of elastic tissue. A dense network of capillary blood-vessels is contained in the wall of each cell, only one layer of which lies between two of the tubular passages, so that the blood in the capillaries is exposed on two sides to the influence of the air, what intervenes between it and the air being the structureless walls of the capillary and air-cell.

The tissue of the lungs, which is spongy, and resembles the so-called "lights," or lungs of cattle sold in butchers' shops, is made up entirely of these cells and capillaries, and each lung is surrounded by a membrane called the pleura, which is a double and closed sac. The outer layer of this is applied to the inner surface of the chest walls, and the inner one to the outer surface of the lung, with which it unites. In health there is no space between these layers, and with the elastic lung tissue they follow the movements of the chest walls. In pleurisy there is an effusion of serum, the watery part of the blood, between the two layers of the sac, and the movements of the lungs are impaired in proportion to the degree of effusion.

I have said that the tissue of the lung is elastic, and the lungs are inflated by pressure of the air they contain. Breathing takes place by means of a difference in pressure between the air in the lungs and the atmosphere, and this is obtained by muscular movements, which insure the dilatation and contraction of the air-cells of the lungs. The lungs themselves are passive, and the action is obtained by increasing and decreasing the dimensions of the thorax or chest cavity to which the lungs are applied by the arrangement of the pleura. The capacity of the thorax alters in an upward

and downward direction by the contraction and relaxation of the diaphragm, a powerful muscle which lies across the body immediately below the heart and lungs, dividing the thorax from the abdomen in such a way that it is always convex towards the thorax and concave towards the abdomen. The middle of this muscular curtain is tendinous, and muscles extend downwards and upwards to the ribs, two strong masses being attached to the spinal column. When these muscular fibres contract, they flatten the diaphragm, and so increase the capacity of the thorax by pulling the bottom of what may be called the chest-box away from the covering of the lower part of the lungs. When this takes place the air rushes in at the windpipe, increasing the distension of the lungs, and preventing any vacuum between the two pleuræ of either lung. When the diaphragm ceases contracting, the air which was drawn in is driven out again by the contraction of the thorax; thus an inspiration and expiration take place. But even without this action of the diaphragm, a similar inspiration and expiration can take place by the extension and return of the ribs, owing to the action of the intercostal muscles, which, when they contract, raise the ribs, drawing them together upwards and outwards, the width of the cavity of the chest being enlarged by their contraction, so that the air rushes in. When the contraction is over, the ribs, like the diaphragm, return to their passive position, and expiration takes place generally by the elastic recoil of the lungs and the increased pressure upon them.

As a general rule the two forms of respiration, diaphragmatic and costal, take place at the same time and aid each other, but sometimes in cases of disease life may be supported by the one without the other.

It is commonly gravely asserted in books on Physiology that the mechanism of breathing is rather different in the two sexes, the diaphragm taking the larger share of work and the upper ribs moving comparatively little in a man, while in

a woman the act of breathing is more largely the result of movements of the ribs. I believe, however, that this statement is based upon a fallacy, namely, that the abuse of corsets in women, by keeping the region of the waist and diaphragm under constraint, prevents diaphragmatic breathing being properly carried on, and throws the chief work of the lungs upon the upper portion of the body. By observations which I have made on women who did not lace at all tightly, I have found that the breathing takes place similarly to that in men. Again it is said that diaphragmatic breathing is not carried on to such an extent in women as in men, as a special provision for the work of child-bearing, as during pregnancy the action of the diaphragm is hindered by the increased internal bulk and pressure from below. That this is also a fallacy I am firmly convinced from personal experience, as I was careful to make special observations on this point during the period preceding the birth of my child. I believe that the assertion that breathing is carried on differently in women to the process in men, arises solely from faulty observation, based on the fact that there is constraint about the waists of women, whereas there is none such in ordinary men. In the case of men who lace tightly, breathing would also naturally be chiefly carried on by means of the upper part of the lungs, the diaphragm being comparatively inactive.

In forced respiration, due to exercise or disease, many other muscles than those referred to are concerned. In bad cases of asthma nearly every muscle of the body is implicated to help in extending the chest, or give fixed points from which the muscles can pull.

Circulation

It is not necessary for me to deal here with the minute structure of the heart, but I may remark, in order to facilitate the understanding of what I am about to say, that this, the great pumping organ of the body, to which all the blood-

vessels are traceable, is usually about the size of the closed fist of the individual to whom it belongs, and is placed between the lungs nearer to the front than the back wall of the

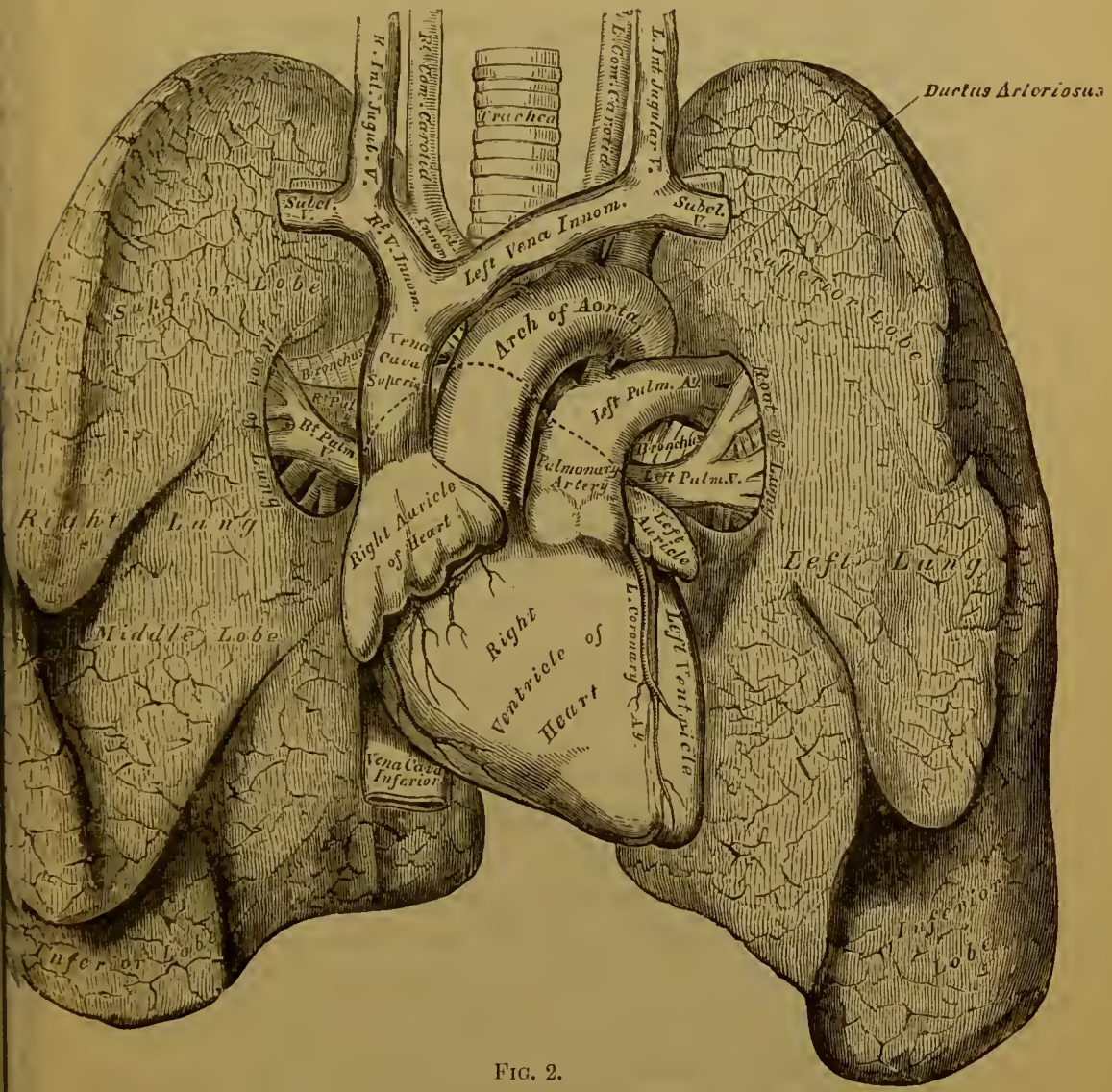

FIG. 2.

chest. Like the lungs, it is enclosed in a kind of double bag, the pericardium, the outer wall of which is closely applied to the diaphragm.

When the diaphragm is pushed up by the stomach, dilated with gases or food, it presses upon the heart, thus causing

palpitation and a feeling of excitement and oppression, and often inducing the subject to fear that he has heart-disease. The heart is also seriously hampered in cases of pleurisy, when it is sometimes pushed out of its position by the accumulation of fluid in the membranes surrounding the lungs.

The heart is divided completely into two parts which have no communication with each other, and each of these is again divided transversely by a movable partition composed of valves. The upper space is called the auricle, and the lower the ventricle. Each of the four cavities thus resulting has the same capacity, and will contain from four to six ounces of blood. The right side of the heart contains the impure blood, the left the pure blood. Each auricle by its contraction squeezes the fluid it contains in two directions, namely, towards the great vein, where its entrance is opposed by the mass of blood contained in the vein and also by valves, and towards the ventricles, into which it passes freely as the valves open to its pressure. As the ventricles fill and become distended, the valves which lie between the auricles and ventricles are pushed up and oppose the entrance of more blood. The auricles then cease to contract, their walls relax, and fresh blood flows into them from the great veins and slowly distends them. The moment the contraction of the auricle or *auricular systole* ceases the ventricular systole begins. The walls contract vigorously, which shuts the valves completely, and prevents the blood from passing back into the auricle. By the contraction of the ventricles the blood is pushed onwards into the arteries. At every systole of the auricles the ventricles fill, and at every systole of the ventricles the arterial system of the body receives their contents.

All the veins from every part of the body, except the lungs, the heart itself, and certain abdominal organs, join into the superior and inferior *venæ cavæ* which open into the right auricle of the heart. The blood from them passes into the right ventricle, and flows thence into the pulmonary artery, which separates into two branches, one to each lung.

The Action of the Lungs

The pulmonary artery and its branches do not nourish the lungs, but simply carry the impure blood into the pulmonary capillaries, where it is purified by the influence of the air in the vesicles with which they are in contact as described above.

The blood by this contact is changed in the following way :—It becomes cooler, gains oxygen and loses carbonic acid gas and some compound ammonias which result from the disintegration of the tissues. The air in the air-vesicles also undergoes certain changes, in that it parts with oxygen to the blood, and gains from the blood carbonic acid gas, compound ammonias, and watery vapour. It is also heated by this contact, the blood in the capillaries being about 99° Fahrenheit, and, therefore, almost always warmer than the temperature of the external air. The losses and gains of oxygen and carbonic acid and ammonias take place according to the law of diffusion of gases, by means of which light gases change place with heavy ones, and to which I shall refer again.[1]

These changes in the blood having been accomplished, the purified fluid passes into the fine vessels which form the commencement of the pulmonary veins, and in the veins we find the process of subdivision, which takes place in the division of arteries into the capillaries, reversed; the little vessels unite with each other, forming larger ones, which go on uniting until they form two large veins, one from each lung, which empty themselves into the left auricle of the heart, to which they bring the pure blood. This passes into the left ventricle, thence to be distributed through the aorta, the main artery of the body, to all parts. The circulation to and from the lungs is called the *lesser* circulation; that to and from the heart, over the rest of the body, in which a similar process goes on, is called the *greater* circulation.

The lungs are nourished by arteries which are called the

[1] See p. 115.

bronchial arteries. These are derived from the aorta and accompany the subdivision of the bronchi, to which I have referred. As will be seen when I come to discuss the subject of the structure of the skin, a purifying process similar to that exercised in the lungs is also carried on in the capillaries of the skin, where the blood is likewise submitted to the action of the external air.

As I have just shown, the action of the lungs is twofold: (1) to supply the blood with oxygen, without which we cannot live, since, by the process of combustion, carried on by its means, the impure blood is rendered into a healthy food for the tissues, and animal heat is evolved;[1] and (2) to carry off impurities and waste products from the blood in the form of water, carbonic acid gas, and certain organic matters. We breathe on an average 30 cubic inches of air 16 times in a minute—that is, $16\frac{2}{3}$ cubic feet of air in an hour. This air, when expelled, is unfit for supporting life, and contains 120 times as much carbonic acid gas as when breathed in. Therefore, to make it breathable, it would have to be mixed with 120 times its amount of air, supposing that to contain no carbonic acid gas. That means that we should have to allow ourselves 2000 cubic feet in an hour. Professor de Chaumont found out that whenever the carbonic acid gas in a room exceeded by more than two parts in 10,000 that of the outer air, the room was stuffy. Therefore, as there are ordinarily in the atmosphere four parts in 10,000, if the carbonic acid gas in any room exceeds six parts in 10,000 of air, that room is not properly ventilated; so if health is to be maintained, each person requires 3000 cubic feet of air per hour, and as the air in a room can only be changed three or four times per hour, unless there is a draught, he wants about 1000 cubic feet of space, which would be given by a room 10 feet high and 10 feet in every direction.

[1] See Chap. IX. p. 117.

Ventilation

If a man were enclosed in a room shaped like a cube of seven feet in the side, he would have breathed every particle of air in it in twenty-four hours; but he would probably have died of suffocation before completely exhausting it. Hence the necessity for ventilation. Air enters a room naturally through all sorts of cracks and crannies, and even through the substance of the walls, besides by doors and windows; but such air is not necessarily pure and fit to breathe, for it may come from kitchens, from beneath dusty floors, or from drains. To keep the air of a room healthy it should be constantly replaced from the outer air, and if we want to avoid colds, it must be replaced without a draught or current of air falling upon us, for cold air entering a room is heavy, and falls like cold water. Warm air is light and rises. Since this is so, cold air generally enters the room at the bottom of the door, while warm, foul air leaves at the top or up the chimney.

If the condensed breath of a number of persons in a close room which collects on the cool window-panes be burnt, a smell as of singed hair shows the presence of organic matters, and, if examined with a microscope after having been left for a few days, it is seen to be alive with animalculæ. The inhalation of air laden with such putrescent matter is a fruitful source of disease.

If one holds the flame of a candle to the keyhole and the flame is blown inwards, it shows that the room is not sufficiently ventilated, since the chief current of air comes from the keyhole and cracks of the door. Ventilation through the door is one of the worst methods of ventilation, for it generally means that the air of the room is changed only by the introduction of impure air from the house, of air tainted by dust, human breath, kitchen odours, and frequently by the exhalations from decaying matter and closets. Every room should have a direct opening into the outer air, and in

order to prevent draughts this inlet should be so constructed that the air entering from without takes an upward direction, instead of falling immediately like a cold shower upon the occupants of the room. For, if the outer air is colder than that of the room, as it nearly always is, it is heavier, and consequently sinks by its greater weight. A simple plan of giving an upward direction to the air as it enters the room is to have an ornamental glass-screen fitted across the lower part of the window, and to raise the lower sash. Air then enters from two quarters, both in an upward direction, since that which enters at the bottom of the sash passes upwards till it reaches the top of the screen, and that which enters between the two sashes is directed upwards by the lower sash, which acts as a second screen. A similar plan is for the bottom edge of the window-frame to overlap by some inches the bottom of the window, which can then be raised to within half an inch of the edge of the frame, so that air is admitted between the sashes only, and of course in an upward direction. In many modern houses the windows are so made as to permit of this, and when this construction does not exist, at the expense of a shilling or two a piece of ornamental board may be fixed for the purpose. Another plan of giving ventilation through the middle rails of the sashes is to have a block of wood to fit the window-frame at the bottom, on which the lower sash, after being raised for a couple of inches, accurately rests (see Fig. 3).

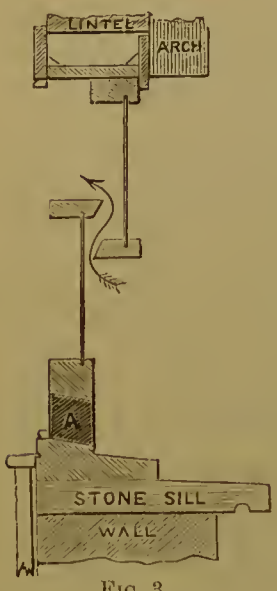

Fig. 3.

This plan, first advocated by Dr. Hinckes Bird, is one of the cheapest, and is suited to the houses of the poor, as is also the still simpler method of boring holes in the wooden surface afforded by the meeting rails of the upper and lower sash. This is rather an effective means of ventilation for

cold and especially for foggy weather, as by placing a light layer of cotton wool over these holes the air is both filtered and warmed on its entrance, and it is quite surprising to see how, in a short time, the wool becomes black and grimy, showing that it saves our rooms and lungs from much soot and dirt. Air, as it enters, may also be filtered by muslin curtains across the windows. Double windows, open below outside, and above inside, give an effective ventilation without draught; and a good plan for large rooms, hospital wards, or halls, is for the top of the window to open with a flap sloping inwards. Such a flap, however, allows the air to fall into the room like cold water, unless the sides are filled up with leather or some similar contrivance, so as to make them more like the Sherringham valve (see Fig. 4).

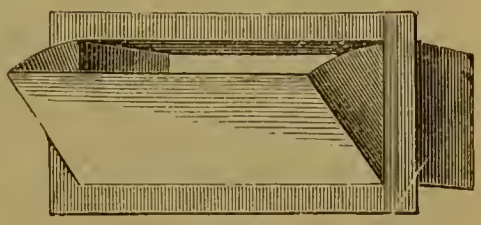

Fig. 4.

The Sherringham valve is an apparatus which is useful if properly placed, so as to admit air from the outside of the house through a perforated brick or grating; but I have seen it fixed in a chimney, where, instead of letting in fresh air, it admitted the smell of soot when there were no fires, and smoke when there were fires. The apparatus can be made to open or close at will by means of a weight which slopes inwards and upwards when the valve is opened.

Fig. 5.

When one has Venetian blinds, rooms can be ventilated without draught by opening the windows at the top, and allowing the strips of wood in the blind to slope upwards and inwards, so as to admit the air in an upward direction. The Louvre ventilator, which is fixed in a window-pane and opens with a cord, is arranged on this plan (see Fig. 5).

These ventilators may be made fixed as well as movable.

But the air is apt to blow down into the room through them when the wind blows, and the same disadvantage is attached to Cooper's ventilator (see Fig. 6), which is a round piece of glass pierced with five openings, covering the centre of a window-pane in which corresponding openings have been made. The circular piece of glass revolves on a pivot in its centre, so that the holes in the window-pane can be either opened or closed as desired.

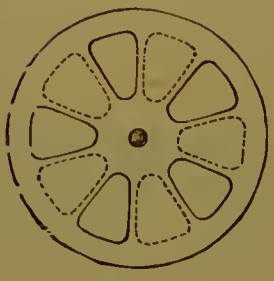

Fig. 6.

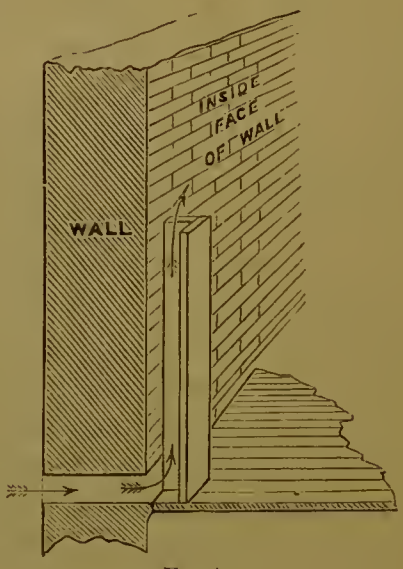

Fig. 7.

Tobin's system, shown in Fig. 7, is, however, the best for admitting fresh air into dwelling-rooms. A tube about four or five feet high opens with its upper end into the room, passes down to the floor, and thence through the wall into the open air. A grating should be placed over the outer end to prevent leaves collecting, or birds building in it, and various contrivances are made to prevent the entrance of soot, and to filter the air. One of the simplest of these is a bag of coarse muslin sewn to a rim of wire, which fits into the top of the tube. These tubes may readily be ornamented, so as not to disfigure a room, by draping with coloured silk or Oriental hangings, or by enclosing them in a marble or china pillar, which may be surmounted by an open bowl, or

vase, or urn, which should naturally have no bottom to it. It is a mistake to leave the top of the arrangement flat, as it tempts people to lay things over it. Again and again I have seen waiters at parties set down trays of refreshments on the top of the Tobin's tubes, thereby cutting off the only ventilation of the overcrowded and overheated rooms. In the majority of cases where Tobin's tubes are used, the chimney serves as an outlet for foul air, and the chimney should never be closed with register, damper, board, or ornamental screen, or, as I have often seen in bedrooms in lodging-houses and country-houses, with a sack of rubbish carefully stuffed up it. When there is a fire in the room the chimney acts admirably: the air in it, being warm, rises, and a current of air sets in up the chimney, fresh air being, as it were, sucked into the room through all openings to take the place of the heated air as it rises. Sanitarians have endeavoured to increase the action of the chimney by the use of Dr. Arnott's valve (see Fig. 8), designed to serve as an exit aperture, and placed in the wall near the ceiling, so as to open into the chimney. The metal valve swings towards the chimney when the air pressure from the room is sufficient to force it inwards; when the pressure from the chimney to the room is the greater, it closes so as to prevent smoke and air entering the room. My experience, as regards such arrangements, however, is not very satisfactory, as they readily get out of order, become blocked with soot, and let smoke into the room.

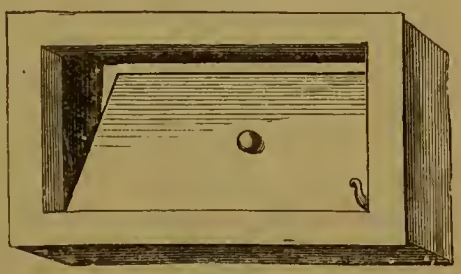

Fig. 8.

In large rooms, especially schoolrooms, billiard-rooms, ball-rooms, lecture-halls, and theatres, where there is much gas-light, special flues should be arranged to carry off the waste products of the gas, and these also serve to ventilate the room by drawing up the foul air as described with regard to

the chimney. One of the best and simplest ventilators on this principle is the "M'Kinnell" ventilator, shown in Fig. 9, which, as may be seen by the course of the arrows, serves as an inlet as well as an outlet. How it does this needs some little explanation. Captain Galton has shown that if many people are crowded into a room the apertures of which are shut, and a tube, of area apparently sufficient to allow ventilation, is carried from the ceiling of the room above the roof of the building, the outer air descends, and the inner air ascends in variable and irregular currents, and if there is any ventilation at all it is faulty. But as soon as the tube is divided in its length from top to bottom the action is changed, a current of fresh air descends on one side of the partition, and a current of foul air ascends on the other. Fig. 9 shows the action of this; the inner and longer tube, which projects below the ceiling into the room, and has a flange surrounding its lower end, serves as an outlet, and the fresh air which descends through the outer tube, by striking against the flange instead of falling directly into the room by its own weight, is thrown along the ceiling, and diffused gradually into the room. The tubes are protected by cowls, so that the wind shall not blow down them. Ventilators on this principle can only act perfectly when windows and doors are closed, as, if the air enters from other sources, they at once become outlets, only drawing the air up. When there is a fire in the room, by drawing the air up the chimney it tends to convert them into inlets only. In private houses this kind of ventilator can only be used in rooms where the ceiling can be easily pierced, as in the case of rooms built out.

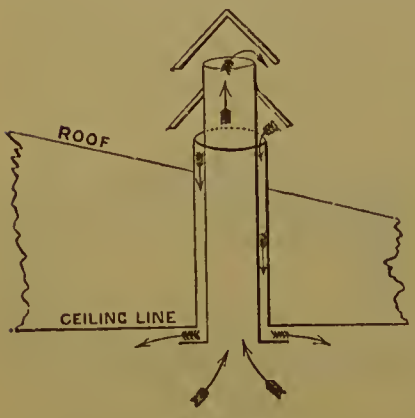

FIG. 9.

As I have said, the lungs cannot perform their duties

unless the air is sufficiently pure, and Professor de Chaumont has proved by experiment that whenever the air of inhabited rooms contains even so small an amount as two parts of carbonic acid in 10,000 over the amount contained in the outer air, the air in the room becomes close and stuffy from the amount of foul organic matter and the excess of moisture contained in it. Hence, if we find the air of a room feel stuffy we should at once take means to purify it by ventilation. But the sensations of breathing become blunted by custom. If we have been sitting for a long time in a close room we do not notice that there is anything wrong, but a person coming in from the outside will exclaim: "Oh, how stuffy you feel in here." The same portion of air cannot be breathed twice over, because the lungs extract its oxygen which they replace by carbonic acid and vapour of water. Hence, if an animal is enclosed in a limited space it dies as soon as the air contained in its prison has all passed through its lungs; but if, when the first animal has breathed, say, about half the air allotted to it, a second is introduced, the second dies before the other just in the same way as some one coming newly into a close room notices that it is close, while one who has been in it for some time does not notice the fact because he has been gradually accustomed to it. Now these observations enable me to give a very simple but a very good rule, namely, that if much time is spent in one room, one should go out of it now and then for a few minutes, and if on returning it feels close, it is not wise to stay in it again until the air has been changed. You can just throw up the windows and leave it for a couple of minutes, and when you return and shut them again you will feel all the benefit of the change.

The purity of the air in any room may easily be tested in the following way:—Get a wide-mouthed stoppered bottle, measured to hold 10½ ounces of water. Clean it, dry it, and stuff a dry cloth into it. On entering the room to be tested, shut the door of the room and remove the cloth rapidly, so that the bottle fills with the air of the room. Have a small

stoppered bottle containing half an ounce of clear lime-water with you; pour it into the large bottle, and replace the stopper. Shake the bottle well for a few minutes. If the air in the room, as sampled in the bottle, is pure, the lime-water will remain clear; if not, it will look turbid, or even milky, owing to the fact that the carbonic acid of the foul air has united with the lime to form carbonate of lime or chalk.

The influence upon us of the air we breathe never ceases for a single moment throughout our lives; day and night breathing goes on without a pause, and each time we draw breath the air that enters our lungs affects us either for good or ill. Bad ventilation is a powerful cause of disease and death. The high mortality from consumption which formerly existed among the Guards was due to the bad ventilation of their barracks, and diminished when the ventilation was improved. In the Dublin Lying-in Hospital, at the end of the last century, one out of every three infants born died within the first fortnight after birth, purely from causes arising from bad ventilation, for an improvement in this respect led to a reduction in the mortality of nine-tenths—one child only dying where ten had died before. It is the young who suffer most from bad ventilation, just as they suffer most from other adverse influences, such as famine, bad climate, and so on. Hence special care should be taken to have airy nurseries, and not crowd a nurse and two or three children into one small sleeping-room.

Sunlight

Very important in their bearing on the purity of the air are the methods by which we light and warm our rooms. First, sunlight is a great purifier. In a remarkable series of experiments the late Professor Tyndall showed that fluids, prepared for the development in them of the living organisms which accompany decomposition, when placed in flasks and exposed to sunlight, remained more free from these organisms

than when placed in the shade; moreover, even during the night the fluid that had been exposed to the sun remained purer. The preservative quality of light is most powerful in direct solar rays, but also exists in diffused daylight. This being so, we can see how foolish is the modern fashion of darkening our boudoirs and reception-rooms with coloured blinds to get a light becoming to the complexion, or of keeping the blinds down in order to prevent the sun from fading the carpets. Never mind the complexion nor the carpets. Let us have the maximum of light and the healthy life it brings; let in the light and the demons of dirt and depression will fly away!

We should use as sitting-rooms those which receive the most light during the day, and not cover up our windows with unnecessary draperies. The by-laws of the Local Government Board require a window-space equal to one-tenth of the floor-area of the room, and if this errs it is on the side of insufficiency. To diminish the lighting space by drapery is most unwise. The only objection to a large increase of window space is the loss of heat, which results from the thinness of the glass and imperfection of fittings. This may be obviated by the use of plate glass or double windows, and by better workmanship in the fittings. Reflectors may be used to increase the amount of light admitted through a given aperture, and these are of special service in rooms which are partly underground, or are lighted from areas, as many kitchens are. In bedrooms the sleeper should not face the window, and precautions should be taken against his being awakened too soon by the morning light.

Artificial Light

Until we have attained that consummation devoutly to be wished, electric lighting in the house, which, owing to the great strides being made, seems not far distant, the artificial light we use will continue to render the air impure. A gaslight consumes as much air as five or six persons, and gives out as much carbonic acid as about six men. Candles or lamps are

preferable to gas because they can be placed near at hand, and thus not so much light is required of them, but they are dangerous, especially where there are children, owing to the possibility of things catching fire from them. If candles were required to give the same amount of light as gas their number would consume as much air. Gas is even more greedy of oxygen than a human being, for one cubic foot of gas burnt will entirely consume the oxygen of eight cubic feet of air. The combustion also renders the air very dry, so that when rooms are heated with gas-stoves a basin of water is frequently placed upon them. If the products of the combustion of gas are allowed to pass into the room an extra supply of fresh air must be allowed. In ventilating, we have to allow for each person 3000 cubic feet of air per hour; for each gas-burner 3600 cubic feet, at least; for each sperm candle, 1200 cubic feet; and for each oil lamp 3000. Taking amount of light into consideration, the cheapest and most convenient present method of lighting is by gas, and this is best supplied by an arrangement which consists of a glass globe descending into the room and diffusing the light, while a ventilating apparatus is attached which carries off all the products of combustion.

The escape of the domestic gas used in lighting our rooms should also be carefully guarded against, as it contains carbonic oxide, which is a very strong poison. An escape of coal-gas is especially dangerous when it takes place under a brightly coloured carpet; for if the carpet, as is frequently the case, is dyed with arsenic, parts of the gas passing through the carpet chemically unite with the arsenic it contains, and together they form arsenicated hydrogen, one of the most poisonous gases known. The worst of an escape of gas is, however, that sometimes the gas gets so filtered in passing through walls, floors, carpets, etc. that it loses its characteristic smell, and thus attacks us insidiously, so that we get our first warning of it in the shape of impaired health. When debility and headache appear without apparent cause, search should be made

for arsenic in the wall-paper, hangings, or carpets, and for an escape of gas, either sewer-gas or the domestic article. If we suspect that it is present we should send at once for a sanitary engineer, not for an ordinary plumber, who will botch up the work and leave things just as bad as before.

For warming purposes gas is now being largely used, but unless there is a proper arrangement for carrying off the impurities of combustion this is not to be recommended. The nose is a tolerably fair guide in this respect, a certain indescribable odour being given to the air by a badly-constructed gas-stove. The stove should allow for a sufficiency of air, and the chimney ought to immediately remove the products of combustion. An open stove greatly assists ventilation; and such stoves as those designed by Captain Galton carry off some of the vitiated air of the room. An open coal fire is, after all, the best kind, for the rays from it do not warm the air, but warm all solid things upon which they fall, warming the furniture and the people in the rooms by direct radiation. A closed stove, on the other hand, warms the air, but not the furniture and persons; and the same is true of the warmth of hot-water pipes. English prejudice, however, is strongly in favour of an open stove, and I must say that I share the prejudice myself. I may observe that a firebrick back to a grate is economical, and a piece of sheet-iron hooked on to the lowest bar, reaching to the ground and fitting to the sides of the stove, converts a quick-combustion stove into a slow one. A very economical way of building a fire is to place a sheet of iron on the bottom of the grate, lay the coal upon that right up, then place a layer of paper on the coal, sticks upon that, and finish with a little more coal on the top. Set light to the paper, and the fire will burn downwards and last for hours without replenishing.

Impurity from Poisons

Another source of impurity of the air is from poisonous colours used in decoration. In spite of all the outcry there

has been, arsenic is still found in wall-papers, colouring materials, American cloth, cretonne, glazed linen, toys, gloves, stockings, etc. : whence it may be given off both in dust and vapour. If the air is damp it forms arseniuretted hydrogen, a very highly poisonous gas. As long as arsenical wall-papers are undisturbed they sometimes do no harm. Thus a family did not suffer from arsenical poisoning until at length they got a very industrious servant who brushed the walls every now and then. This set free the poisonous particles, and two of the children were affected by mysterious symptoms, afterwards traced to arsenical poisoning, from which one of them did not recover for seven years. There is sad need in England of legislation in this respect, and the sooner the matter is thoroughly investigated the better. In some parts of the Continent stringent laws are enforced with regard to poisonous colours, which have been found not only in wall-papers, but in children's toys, dress materials, wrappers used to envelop articles of food, and even in sweetmeats.

Symptoms of arsenical poisoning are drowsiness, weakness, internal pain, severe depression, swelling of the throat, feverishness, and—which is very important—a metallic taste in the mouth. All these symptoms have been produced by arsenical wall-papers, and would probably result in an increased degree from arsenic in clothes, but in this case perhaps the cause is not so likely to be suspected. There is a popular idea that green is the only colour in the production of which arsenic plays a part; but this is a great mistake, for not only can good greens be obtained without the use of arsenic, but very many other colours, such as red, yellow, mauve, fawn, magenta, brown, blue, and even innocent-looking gray, and white, are frequently contaminated by it. Hence it is not sufficient, in order to escape risk of poisoning by arsenic, simply to avoid certain colours, but samples of wall-papers or dress materials should be tested for the poison. Cut a strip of the suspected wall-paper about two inches long and one-eighth of an inch in width, and

burn it slowly in the blue part of the flame of a spirit-lamp or jet of gas which has been turned down. If, while it burns or smoulders, a smell of garlic is developed, the paper undoubtedly contains arsenic. If the odour is faint the quantity is small, the smell being stronger in the case of substances containing a larger proportion.

Dust

In furnishing, everything that can encourage the deposit of dust should, as far as possible, be avoided. Heavy furniture, unless it reaches from floor to ceiling, should be on wheels so that it can be moved. Carpets which entirely cover the floor, being nailed down and not removed nor shaken from year's end to year's end, are an abomination to the sanitary reformer, since they are the resting-place for dust and dirt of all kinds, and a fertile soil in which disease germs may increase and multiply when they chance to stray that way. If a room is to be carpeted, let the carpet be made so that it can be taken up and shaken and the floor scrubbed every fortnight. It is a good plan to have the edge of the floor polished, painted, or enamelled, and the centre covered by a square of carpet which can be taken up in a few minutes. The best kind of floor is a parquet floor closely laid and well polished, which is advisable on account of its being readily cleaned and requiring only a rug here and there to make it look comfortable and even elegant, and which is always delightfully available if the young people want to get up a dance. It also serves to prevent the entrance from below of damp, noxious vapours, and the dust from the more or less harmful rubbish which is found between the ceiling of the lower room and the floor of the upper. As I have said, air enters a room from every quarter, not only through cracks and crannies, but even through the brick wall itself, and the floors, and the less ventilation there is through proper channels communicating with the outer air, the more air is

sucked into the room through improper channels and from questionable sources. Hence floors should be made as impervious as possible, and where parquet is beyond the reach of the householder's purse, let him caulk the seams of the floor with oakum, plane down and varnish over the whole, so that the washing or wiping the floor with a wet cloth can be a matter of bi-weekly or even more frequent occurrence.

Dust-bins should never be in the house. The best kind is the round movable sanitary dust-bin, which is made of zinc, and can be placed in the garden or coal-hole, whence it can be carried out by the dustman twice a week in order to empty it. Vegetable and animal refuse should be burnt behind the kitchen fire and never thrown into the dust-bin.

CHAPTER IV

DRAINAGE AND WATER-SUPPLY

In the last chapter I only briefly mentioned the dangers arising from the escape of sewer-gas into the air because it is necessary to treat the subject at some considerable length in connection with the important matter of drainage.

However charmingly situated, attractively built, and prettily furnished a house may be, it is practically a death-trap and a stronghold of disease unless due attention has been paid to its drainage arrangements. How many people ever think of this when they are taking a house? Out of sight is in this case out of mind. As long as the externals are effective we are apt to think little of the internals, which are of so much more vital importance. Large traps clogged with accumulations of putrefying matter, or elaborate contrivances for letting sewer-gas into our houses; defective pipes, and still more defective joints, allowing drainage drippings to saturate the regions beneath the floors of our kitchens and offices, and poisoned air to enter our houses, are almost oftener the rule than the exception. Now we find a brick sewer with many leakages, running up and down, irrespective of the fall of the land, depositing its contents here and there, and discharging, not into the main drain, but into a cesspool, which very possibly lies just beneath the kitchen floor. Then we may discover a stagnant pool under the pantry; or, again, rats working through may show that we are in direct

communication with the sewer. Rats are, indeed, a danger-signal of the most serious kind, and if there is any sign of them a careful inspection should at once be made. A house acts as a sucker, and draws up from the soil damp and all kinds of mephitic vapours; hence the necessity for damp-proof courses and concrete floors under the basement, and this also adds importance to the proper arrangement of drainage. To ascertain in what condition the drainage of the house is should be one of the first cares of the intending tenant; but this is perhaps his greatest difficulty, as the drains being hidden away out of sight, even when a good general plan has been adopted, and all the visible apparatus is perfect of its kind, the underground work may be done in a slovenly and careless manner. "If you want a thing done well, do it yourself," is an old saying, and if you are going to have new drains put into a house inspect the work at every step. As a case in point, a gentleman told me only the other day that in a house of his a ventilating shaft, such as I am about to describe, was to be carried up from the drain over the roof of the house, but on going to inspect the work he found that instead of connecting the shaft with the drain, as shown in illustration (Fig. 10) B, the workman had simply stuck the bottom of it in the ground, so that, even if ornamental, it was certainly not useful. This was done apparently to save the expense of a few inches of pipe.

Of course it would be preferable for the house-drain to be above ground, so as to be easy of inspection, but it would be unsightly, and to have it so would be difficult, as the by-laws of the Local Government Board indicate that it should be at least a foot lower than the floor of the lowest rooms. Since the house acts as a sucker, if possible no part of the drain should pass beneath the house. In many town districts, however, where the closets are at the back of the house, and the sewer runs down the middle of the street, the house-drain is of necessity brought beneath the basement, and here it is still more important to have a concrete basement

and concrete bedding for the drain. The chief objects to aim at in drainage are the immediate removal from the house of foul matter, and the prevention of any back current of foul air from pipes or drains. The water-carriage system best serves the first object, provided that the pipes have a proper incline or fall towards the sewer, and are laid on a good bed of concrete to prevent the possibility of their position being disturbed by subsidence of the earth, which might strain the joints and permit escape of foul matter. All joints should be carefully sealed.

The essentials for good drainage are :—(*a*) Plenty of water and a good fall towards the main drain or cesspit; (*b*) Thorough ventilation throughout the system; (*c*) Simplicity of structure and good workmanship.

To prevent the return of foul air into the house, a number of traps of more or less value have been devised, of which the old Dipstone trap, the D trap, so called because in shape it resembles that letter, and the Bell trap, which has a movable cover, shaped like a bell, are to be thoroughly condemned. The D trap has been christened the "death trap," and the B trap the "death-bell trap." On the whole, the most satisfactory trap is the syphon, or S trap, but the safety-water may, even in this, be emptied out by pressure of air in the drain, or the rush of a great volume of water; so these accidents have to be guarded against by inserting a ventilating pipe. Just as an egg with one hole in the shell cannot be sucked out, so one opening is not sufficient to ventilate a drain; and besides the ventilating shaft, which should be carried up above the roof, another ventilator is needed.

The best house-drain for an ordinary house is a 4-inch drain-pipe, well tested at the joints and bedded in concrete, arranged so that there shall be a proper fall and discharge into the sewer, while a syphon trap guards against the ascent of sewer-gas into the house. This drain should be ventilated by a 4-inch pipe brought up the side of the house and opening some inches above the roof, *not*, as frequently hap-

pens, up a rain-water pipe which opens on a level with the upper bedroom windows, and pours poisonous gas in upon the unconscious occupants, and which, moreover, is liable to become stopped with dead leaves, etc.

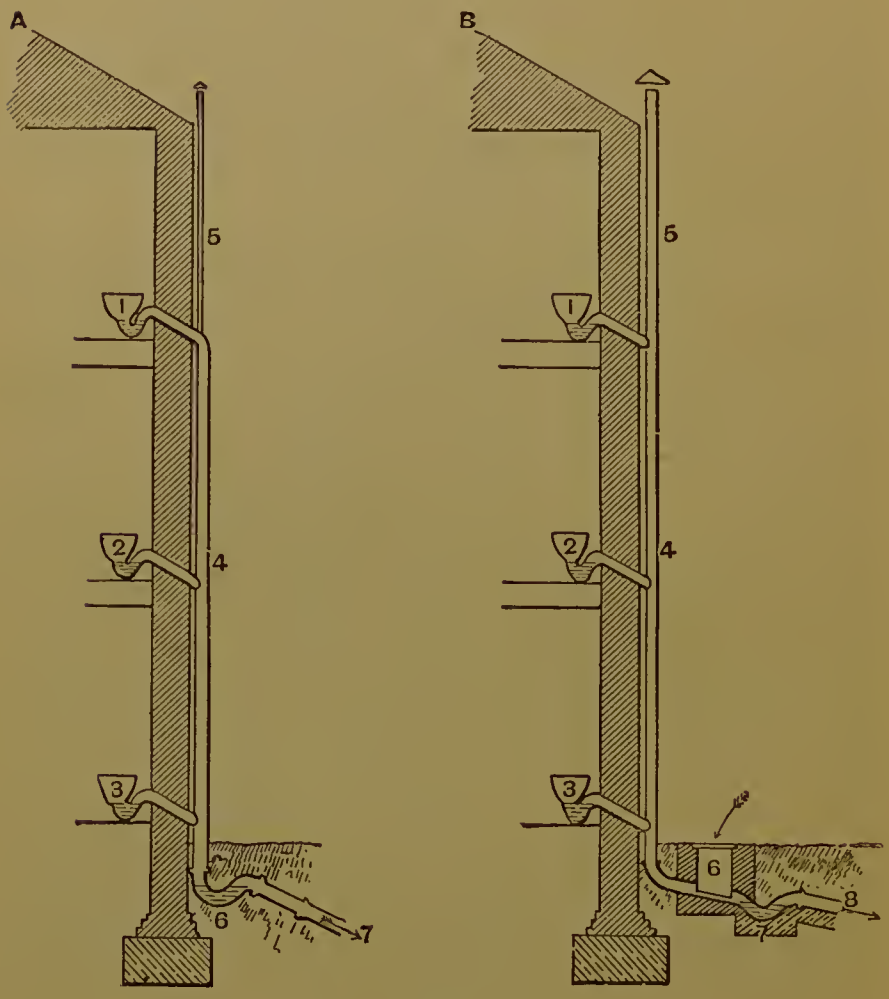

Fig. 10.

The accompanying illustration gives a good idea of a perfect system of drain ventilation, and a system spoiled by ignorance of its true principles.

Fig. B shows—1, 2, 3 water-closets; 4, the soil-pipe from them; 5, 4-inch ventilating shaft, the full diameter of the

soil-pipe; 6, the disconnecting chamber with open grating, to complete circulation of air and prevent accidents to 7, the syphon trap, which shuts off the house-drain from 8, the drain leading to sewer. Since this arrangement shuts off the house-drain entirely from the sewer, even if the sewer, which is beyond their control, is out of order, no harm can come to the inhabitants of the house. In looking at Fig. B, the drain trap and disconnecting chamber is seen bedded in concrete, with a gentle inclination and no abrupt bends in which matters may lodge. In Fig. A there is no concrete bed, so that the joints may be strained by sinking of the soil, and matters escape into the earth; abrupt bends are formed at the bottom of the soil-pipe. There is no disconnecting chamber to afford ventilation to the syphon and to complete the current of air, and the ventilating shaft is only a 1-inch pipe, quite useless for the purpose intended. It is necessary to say a word or two as to the position of the grating and ventilating opening shown at Fig. B, 6. This should not be in a position where children are likely to play, lest they should hold their faces over it; but, barring this, if the drain is properly constructed it will not give rise to bad smells or injury to health, for the current of air passes more into the drain than out of it, this serving as the inlet, while the outlet is at the top of the ventilating shaft; but even if now and then the current should set the other way, the air in the drain having been constantly changed will not be sufficiently charged with sewer-gas to be injurious. The grating may easily be placed in the area of a London street or square.

The following illustration (Fig. 11) gives a clear idea of a simple yet perfectly sanitary drainage system.

The pipes of the drain itself are 6 inches in diameter, with collars or sockets, each carefully cemented with best Portland cement, and they must be laid on a firm bed to prevent sinking and consequent fracture.

At A is an efficient ventilating syphon trap (Fig. 12), to

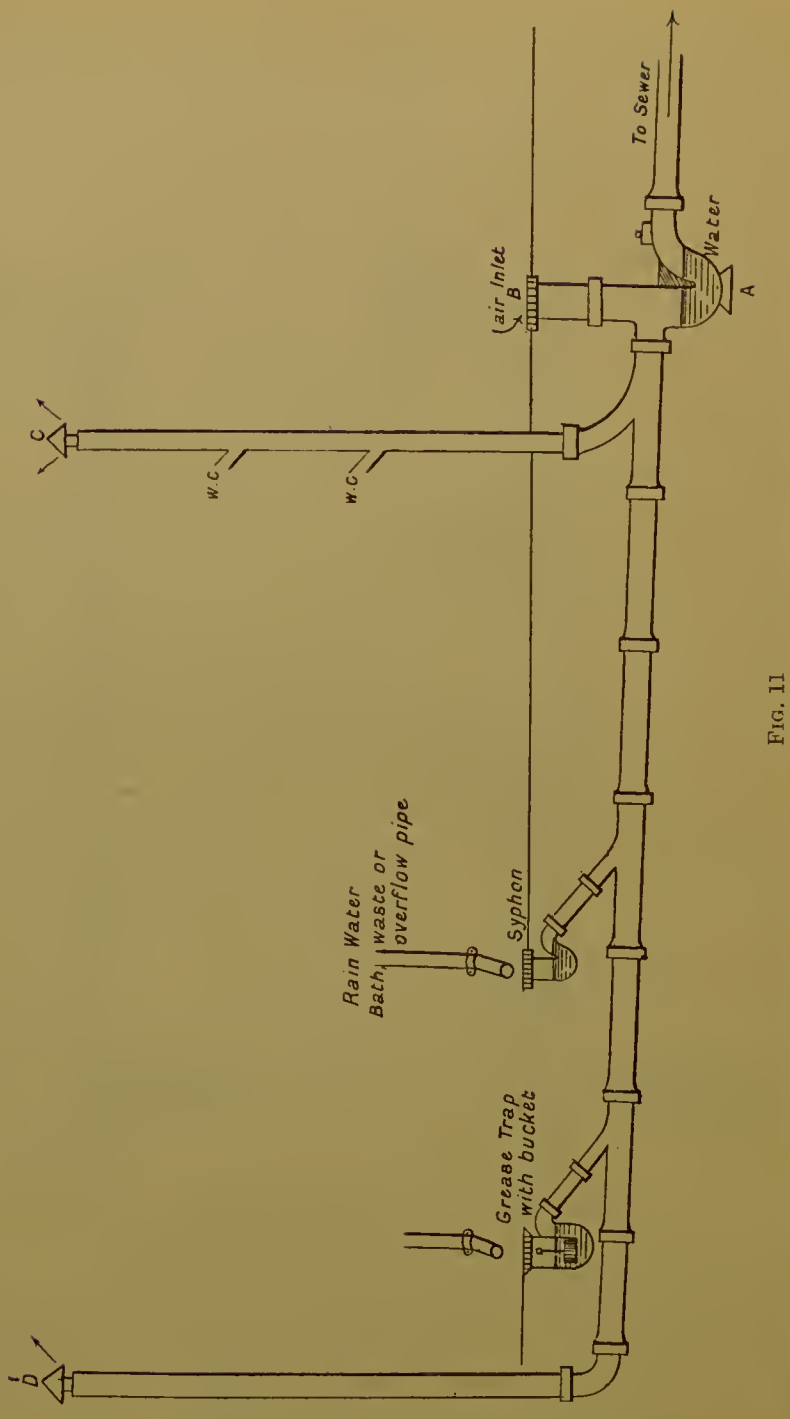
To Sewer
Water
A
air Inlet
B
C
W.C
W.C
Rain Water
Bath
waste or
overflow pipe
Syphon
Grease Trap
with bucket
D

Fig. 11

keep back the gas from sewer or cesspit; but should a small quantity be forced past, it will at once be diluted and propelled up the air-shaft C by the current of air from the inlet B. (This can easily be proved by igniting a handful of shavings at B, when the smoke will instantly appear at C.) This plan frees the drain from gas, and relieves the smaller traps from any pressure.

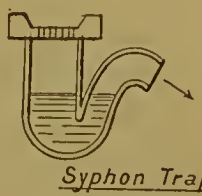

FIG. 12.

The air-shafts C and D are of stout 4-inch iron or lead pipe, and are carried well above the roof, clear of all windows, chimneys, or drinking-water cisterns; they receive the soil-pipes from the closets on the different floors. And here is a point that requires a little attention. When a sudden flush of water descends from a higher floor, it often unsyphons (*i.e.* sucks the water from) the traps of the closets immediately beneath. To prevent this it is necessary to run up a small pipe, *c*, by the side of the larger one C, and connect the trap or syphon of each closet with it (see Fig. 13).

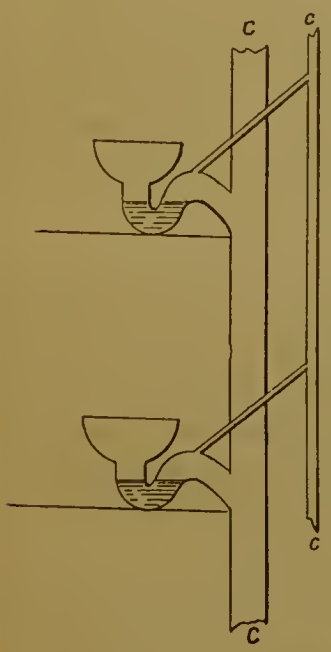

FIG. 13.

We next come to the connection of the various yard gullies, waste and overflow pipes from sinks, baths, etc. Every one of these should discharge in the open air over a simple syphon trap, with a grating, as in Fig. 12.

In no well-regulated household should ordinary bedroom-slops be poured away down the sinks; they should be emptied down the closet. The waste-pipes from sinks, and especially those in the kitchen regions, are apt to become obstructed by grease, and in order to obviate this, grease traps are often placed in the pipe itself or in the yard gully. The chief

requirement of these is that they should be simple in construction, so as not to get out of order, and easily accessible for cleansing purposes. A grease trap placed outside the scullery sink is indispensable to good drainage, in order to separate and retain all particles of grease which would otherwise collect in the drain and eventually completely choke it. The iron bucket which retains the grease, and with which most of these traps are provided, should be emptied frequently, especially in hot weather.

The accumulation of grease is one of the direct causes of the obstruction of waste-pipes, and it is therefore most desirable to prevent the possibility of grease entering the house-drain and obstructing it.

The stoppage of waste-pipes is often a serious inconvenience, if not a danger, in a house. If the pipe is obstructed or allows the water only to flow away in drops, it should be emptied as far down as possible by mopping up with a cloth. Then if the water flows slowly when the pipe is all but emptied, fill it up with potash, cramming it in with a stick. The commonest kind of potash appears to act as well as the best. Pour hot water upon it in a small stream, stopping as soon as the pipe appears to be filled, and as the potash dissolves and runs away, pour in more water. At night a small heap of potash may be placed over the hole, and enough water poured on it for a supply of strong lye to flow into the pipe during the night. Pipes that have been stopped for a long time may be cleaned in this way, although even three or four pounds of potash may be required. If a pipe is only partially obstructed, a lump of crude potash should be put where water will drip on it slowly and reach the pipe, or the same plan may be adopted as before. Soda and potash are both used to remove greasy obstructions, and the usual plan is to form a strong lye and pour it into the pipe ; but it is better to put the potash into the pipe, because the water it contains helps to form the lye. As water comes in contact with the potash heat is evolved, which helps to dissolve the

grease, and the potash, combining with the grease, forms a soft or liquid soap which easily flows away. Soda, however, forms a hard soap, which would itself obstruct the pipe if not dissolved in water. After a pipe is fairly cleaned out, potash should be used from time to time to keep it clear. It serves also as a sort of disinfectant, as it is destructive to all animal and most vegetable matters.

The following is a most valuable disinfectant for drain, cesspool, or closet :—Dissolve 30 grains of nitrate of lead in a quart of water, and dissolve separately 120 grains of common salt in 3 gallons (a pailful) of water. Pour the two solutions together and let them stand until the sediment quite subsides, then pour off the clear liquid, which is a saturated solution of chloride of lead. If a cloth or towel is dipped in this and hung up in a place where there is fetid gas, it will absorb it, converting it into sulphide of lead, which is insoluble, and therefore innocuous. The above proportions must not be departed from, as they have been carefully calculated. The solution is invaluable for dust-bins, and may be sprinkled on floors with a small watering-pot.

A simple method of testing drains, to ascertain whether they are sound at the joints, is to pour oil of peppermint mixed with hot water down the upper end. If any of the joints are weak the smell may be detected about the house, and as sewer-gas might enter through such joints as the odour may show up, a plumber's aid should be called in. A very good plan to detect sewer-gas in a room is to saturate unglazed paper with a solution of one ounce of pure acetate of lead in half a pint of rain-water. Let it dry partially, and then expose it in the room suspected of containing sewer-gas, the presence of which in any considerable quantity soon blackens the test-paper.

Baths and fixed basins supplied with hot and cold water are doubtless most desirable comforts in a house; but unless proper precautions are taken they constitute a great danger. There is always a pipe from such basins and baths to carry the

used water away to the main drain, and if this pipe is directly connected with the drain, not only does the water run down it, but sewer-gas forces its way up and diffuses itself through the room, bringing with it the risk of sore throat, diphtheria, and typhoid fever. Such pipes must be disconnected from the drain by being cut off in the open air, about 8 inches above a trapped gully leading to the drain.

It was from the neglect of such a precaution that the Prince of Wales contracted typhoid fever, and the sweet young Countess of March was stricken to death. Indeed, few of our best families have not had some member to mourn, whose death was traceable to such an error of drainage, for these faults are most common in old country-houses. Stringent legal penalties should be enforced in cases where tenants suffer from neglect on the part of the landlord, and in this connection it is pleasing to note that not long ago £100 damages were awarded to a gentleman whose daughter had died of disease caused by the defective drainage of the house they occupied. All sinks should similarly be disconnected above yard gullies, as shown in the illustration Fig. 12, p. 49.

The position of closets in a house is a matter of great importance, which is generally neglected. In very many houses I have seen a large cupboard on the landing with its door facing the door of the best bedroom, and no ventilation save on to the staircase, utilised for this purpose; in old houses this largely prevails, though a worse arrangement could hardly be found, and I may say that, if it is not possible to make more valuable alteration, a 4-inch ventilating pipe should be passed through the ceiling of the closet up the wall, on to the roof, where it should open into the air. Inside the closet it should project downwards over a gas jet placed six inches beneath it. The gas, by warming the air, causes it to ascend the pipe, thus drawing cooler but purer air in from the house, and drawing off the bad air up the pipe; but it must be remembered that the pipe is useless un-

less the gas is kept alight. If the air of the house is warmer than that in the W.C., cold air comes down the pipe, and the bad air will be drawn off into the house. Closets ought to be placed against the outer wall of the house, so that their windows can open directly into the outer air. The best way is to place them in a built-out shaft, which may be formed like a tower, with a small ante-room or passage separating and cutting them off entirely from the house; on each side of this ante-room or passage should be a window, so as to cause a current of air to pass through it, and thus entirely prevent the entrance of foul air into the house. With regard to the closet itself, the old pan closet is the most to be condemned, as it is so difficult to keep clean unless a very full and constant supply of water is obtainable. In this a metal pan works inside a container, below which is our old enemy, a D trap. Foul air which collects in the container is apt to escape into the apartment as soon as the handle which releases the pan is used. There are four points to be noted in choosing these fittings: (1) The basin should be of such a shape and size as to hold enough water to ensure thorough cleansing and flushing. (2) The basin should be of such material as to render it always evident whether it is clean or not. White glazed earthenware is preferable. (3) If the closet is trapped, the trap should be in one and the same piece with the basin. (4) Valve closets, in spite of many advantages, are undesirable on account of the metal fittings, which are liable to corrode. (5) The old form of square closet, surrounded by a sort of wooden box right across one end of the apartment, is objectionable, as foul air and water are apt to collect in and about the woodwork.

The "wash-out" patterns are effective; and the basin should have a wooden movable flap seat, the weight on which causes the flushing of the apparatus. The so-called Syphonic closet recently taken up by the London County Council has much to recommend it, and overcomes the difficulty mentioned on p. 49 with regard to the unsyphoning

of traps. In case of water overflowing the basin, every closet should have a safe beneath it, with an overflow pipe leading straight into the open air. At the outside end of this pipe should be a clack valve, allowing free passage of water from within outwards, but preventing the passage of air inwards. Whether closets themselves should be trapped is a vexed question, but the preponderance of reason is perhaps against traps, as of whatever construction these are they must necessarily, owing to their bends, be an impediment to the passage of matters from the closet. They would do more harm than good if the system of drain trapping and ventilation, which I have explained, be adopted. What is called "a temporary plug" is a better arrangement for keeping the necessary amount of water in the closet basin.

Water-Supply

I come now to discuss the important question of water-supply. Good water should be clear, colourless, aerated, fresh to the taste—that is, neither salt nor sweet, should have no particles suspended in it, and deposit no sediment when left standing. If *all* these attributes are not present the quality of the water may be suspected. Water may possess all these conditions, however, and yet not be good drinking water, owing to its containing substances in solution which render it injurious; such substances as either mineral salts, organic matters, or the result of their decomposition, such as salts of ammonia, nitrates, nitrites, etc. The most dangerous impurities of water, namely, the germs or the microbes of disease, can be detected neither by taste, smell, appearance, nor even by chemical analysis.

It has been proved beyond question that these infinitesimal living creatures or plants are the cause of such serious diseases as cholera, typhoid fever, etc., which are distributed by water. In general, deep well water, if the well is quite sound, is safe; and there is plenty of water from such sources and from others which is quite fit to drink without any precaution.

There is, however, considerably more which is not safe, and it is a very difficult matter to tell the difference—indeed, only a bacteriologist can do so. An accident at the waterworks may without any notice contaminate a whole town supply, as with the cholera epidemic at Hamburg, and in earlier years in London, which each arose from temporary disturbance of the filtering beds for scarcely more than a few hours. Water, therefore, should always be purified in the house where it is drunk, which may be done by boiling it for a quarter of an hour on two consecutive nights, the first boiling killing all the fully-developed microbes, but not the germs, which develop and are killed on the second boiling before they can produce further germs. Such water should not be kept over the following day, as the process of boiling is very liable to render it suitable for the cultivation of any germs which may fall into it, although before boiling it was not so.

Boiled water is, however, less digestible and less palatable than unboiled, owing to loss of gases and mineral salts. It is better to filter water through the Pasteur filter, which in its ordinary form has practically no effect on the chemical composition of the water, but arrests on its surface every germ or microbe as well as all suspended matter. The deposit is readily brushed off under water either by hand or by an automatic cleaner. Ordinary filters are useless, or indeed even dangerous, because they form breeding-grounds in their interior for germs, which in that position it is impossible to dislodge or kill.

M. de Freycinet, in his reports of 1889, 1890, and 1891, as Minister of War to the French Republic, has shown the effect of the introduction of the Pasteur filter into the French army as a protective against typhoid fever, which in his report for 1892, he sums up by stating that wherever it was applied to water pronounced bad, typhoid fever disappeared. The filter was originally devised in M. Pasteur's laboratory for separating germs from the broths in which they were cultivated.

It is made in forms suitable for direct attachment to the

house supply, and in the ordinary vase form; and for houses depending on wells, rain-water, or streams, there are forms with pumps by means of which the water is pumped up and filtered at the same time.

The hardness or softness of water depends on the presence of mineral salts in solution. The smaller the quantity the softer the water. If more than six grains of carbonate of lime is found per gallon, the water is hard; if less than six grains, it is soft.

There is not much evidence that hard water is injurious internally, but it is certainly bad for the complexion, wastes a large amount of soap, and is not so good as soft water for boiling vegetables and making tea. The harder the water the larger the waste of soap, because the value of soap for cleansing depends on the amount of lather it can make. Soap is made of a combination of acids prepared from fats, with soda for hard soaps, or potash for soft soaps. When mineral salts, such as those of calcium, magnesium, or iron are present in water, insoluble compounds of the fatty acids are formed with the oxides of calcium, magnesium, and iron, and no lather can be produced until all the salts are used up in this way. Hence, if possible, soft water should be obtained for washing purposes, or hard water may be rendered soft on a larger scale by what is called "Clarke's Process," or for the bath by "Scrubb's Cloudy Ammonia."

Water for drinking should not be allowed to stand, or be kept in a room overnight, as it takes up any impurities there may be in the air.

Storage of Water

Since water readily takes up all kinds of impurities and disease germs, it should not be stored for any length of time in the house, or in water-butts outside it. In all poorish neighbourhoods, thousands of cisterns and water-butts may be seen, dilapidated and broken, some with covers, some without, and more with remnants of covers which

make a vain pretence of keeping impurities from the water beneath. Such a method of storage is doubtless responsible for much disease among the poor, nor can we wonder that many, seeing the unsavoury nature of the water provided for them, take to stronger and more tempting beverages. But even in better-class houses very little attention is given to the condition of the cisterns, either as to their construction or cleanliness; for even if the construction be excellent, a periodical cleansing is absolutely necessary, and to properly clean a cistern a man should get right inside and thoroughly sponge it out. The constant supply system is certainly the best, and wherever it can be obtained the householder should endeavour to obtain it, and not grumble at the expense entailed by the necessary alterations of fittings; but even with the constant supply system cisterns have to be used, and we must, therefore, consider the best method of arranging these.

The materials used for modern cisterns are iron, slate, wood lined with lead, lead lined with tin, and glazed stoneware. There are two kinds of iron cisterns which are economical and serviceable, galvanised and ungalvanised; the advantages claimed for the former may sometimes be questioned, as there are always a few pinholes through which rust can attack the iron, and as voltaic action is engendered by the contact of the two metals, it gains faster upon the galvanised iron than upon iron not treated in this way. Lead is not at all a fit material for lining cisterns, nor for pipes to convey drinking water. A slate cistern, if well made, is perhaps the safest and cleanliest of those in ordinary use, but it is heavy and cumbrous. The chief requirements in a cistern are that it shall be impervious, not easily corroded, and provided with a well-fitting cover made in sections, so that it can easily be removed. The position of the cistern is the next item of importance. To fix it in the floor of a bedroom, in the ceiling of a water-closet, or in a dusty roof, as is commonly done, is a serious mistake. Of course, sometimes better provisions for it cannot be made;

but when it is possible a small tank-room, with a small window for ventilation, should be set apart, and in such a position the cistern is protected from frost and easily accessible for cleaning purposes. No direct sunlight should enter as the water must be kept cool. It is best fixed on strong bearers about two feet above the floor, so as to leave room for a man to work underneath for the adjustment of pipes, repairs, and the like. If it is placed on the floor the ceiling below has to be cut away before such work can be done. The water enters the cistern through a ball valve, the copper ball floating on the water and rising with it, so as to close the valve when the tank is full. If this valve always acted perfectly there would be no need for an overflow pipe, except to empty the tank more rapidly for cleaning; but the valve is apt to get out of order, so such a pipe is fixed above the ordinary level of the water, and has its exit at the bottom of the tank. These overflow pipes have not infrequently been a source of very great danger by being allowed to discharge into a drain or sewer, so that foul air passed up through them, contaminating the water in the cistern, and affording a ready entrance for typhoid and other disease germs into the house. Traps are useless to afford protection in such cases, the only safe way being for the overflow pipe to discharge into the air where it can be seen. A brass clack-valve should be attached to the end of the pipe to prevent the entrance of freezing air.

It is most undesirable that water-closets should be served direct from the same cisterns as supply the drinking water, and for this reason small iron cisterns are introduced which are filled through a pipe from the chief cistern, and in turn supply the closet. Under the "constant service" system these have been employed as waste preventers, holding sufficient for use for each discharge, and refilling when emptied. The overflow of a cistern should never discharge into the soil-pipe from the closet, for if it does so the foul air ascending it must contaminate the water.

CHAPTER V

DIGESTION

The simplest idea of the human digestive apparatus is that of a long pipe which varies in its circumference in different parts. This pipe begins with the mouth, passes down through the chest, pierces the diaphragm, and then expands into a sort of bag called the stomach, which bulges out at the side nearest the heart. Passing across towards the right side of the body it narrows again into what is called the bowels or intestines, which are about six times as long as the whole body. The bowels are divided into two parts, the small intestine and the large intestine. The small intestine at its opening into the large has prominent lips, which allow matters to pass through them into the large intestine, but prevent their returning from it into the small; this is called the *Ilio-cæcal* valve. Beyond this the large intestine forms a blind dilatation, the *cæcum*, from which a blind process is given off, the vermiform appendix of the cæcum. The large intestine then passes up on the right across under the stomach, and down again on the left side, then after a bend like an S it goes straight down in what is called the *rectum* to its lower opening, whence refuse matters are expelled from the body. The actions to which food is submitted in digestion may be arranged in four groups:—

The actions of the mouth and gullet.
The action of the stomach.
The action of the small intestine.
The action of the large intestine.

The machinery of digestion begins with the mouth, in which there is a powerful muscular organ, the tongue, which has fibres running both along it and across, so that by their contraction it can be moved in all directions. The tongue moves the food about in the mouth and presses it between the teeth, which grind it and pound it and tear it till it is reduced to a pulp; what food oozes out between the teeth is pushed back by the muscular contractions of the cheeks. The membrane which lines the mouth has in it a number of depressions, minute sacs, which are called glands, and these secrete different kinds of fluid, which together make up the saliva or spittle. This, mixing with the food, moistens it and assists in reducing it to pulp.

No food can be converted into blood unless it will mix with water. Now starch does not mix with water unless the water nearly boils (212°); but the water in our bodies is only warm (98°). Sugar, however, will mix perfectly with water, and in the saliva or spittle in our mouths there is a substance called ptyalin which has the power of changing starch into sugar. On taking a mouthful of new bread and chewing it, it seems to taste sweetish; this taste is caused by the change of the starch in it into what is called grape-sugar by the chemical action of the ptyalin. This, although it forms only about one and a half per cent of the whole saliva, is characteristic in smell and chemical action. Air bubbles also exist largely in saliva, and this air assists in digestion.

The roof of the mouth is formed by the hard palate, which is joined at the back by the soft palate, a sort of fleshy movable curtain, the middle of which is prolonged into the *uvula*, while its sides are skirted by double pillars of muscular fibre running upwards and downwards, called the pillars of the *fauces*. When the food has been reduced to pulp the tongue rolls this up into a ball, which passes to the back of the mouth. Directly this ball touches the soft palate the fleshy curtain rises and covers an opening that exists into the nose; at the same time a little door closes down over the

opening of the windpipe, and the ball passes over it into the gullet, which lies behind the windpipe. The entrance to the windpipe or trachea is always open except when we swallow; that to the gullet always closed except when we swallow. The whole digestive tube is provided with a muscular coat containing fibres, some of which are longitudinal and some circular. The fibres which go in its length, when they contract shorten the tube; those which go round it, when they contract narrow the tube. When the ball of food reaches the first set of muscles they contract and seize it, then the long fibres contract and draw up a short length of tube, into which the food is pushed by the contraction of the first, and this action goes on till the food reaches the stomach.

The same action takes place in drinking.

The stomach, like the gullet, has muscular walls of unstriped muscular fibres, and is lined by an epithelium or mucous membrane, the surface of which is covered with glands. The juncture of the gullet with the stomach is called the *cardiac aperture*. When the stomach is empty its lining membrane is a pale pink, and hardly more than moist; but on the entrance of food a nervous action is set up, the small arteries dilate, and the mucous membrane consequently receives a larger supply of blood and becomes very red, little drops of fluid gather at the mouths of the glands with which it is covered, and these drops finally run down as gastric juice. The contractions of the stomach roll the food about; as it enters from the gullet it passes round to the left along the greater curvature, and back along the lesser. The stomach squeezes and churns the food until every part of it is mixed with the gastric juice. This squeezing action cannot take place unless there is a sufficient amount of food in the stomach, nor does it take place in the case of liquids, which are immediately absorbed by the thousands of little vessels contained in the mucous membrane, and which enter the blood without further digestion. For instance, if soup is swallowed the liquid part is immediately absorbed, while the proper action of the

stomach cannot begin until, from the absorption of the liquid, the remains have obtained a certain consistency. The muscular action of the stomach reduces pulp of food, which as it is swallowed is rather stiff, to a still softer pulp, and the gastric juice, which is a powerful acid, dissolves a great part of it. The gastric juice, however, has no influence on starch, sugar, nor fat. Fat is merely reduced to oil in the stomach. By continual rolling about and the action of the gastric juice, the food becomes reduced to the consistence of pea soup, and is called *chyme*. A great deal of the fluid—consisting of peptone, *i.e.* the food, such as meat, which has been affected by the gastric juice, and sugary fluids resulting from starch changed by the saliva or other sugar—is at once absorbed, through the walls of the numerous and delicate blood-vessels of the stomach, into the blood. The remainder of the chyme passes out into the small intestine through a valve which is situated at the junction of the stomach with the small intestine, and is called the *pylorus* or "gatekeeper," because from its exquisite sensitiveness it permits only that food to pass which has arrived at the proper stage of digestion. The "gatekeeper," however, if tried too hardly after having several times refused to let indigestible matters pass, at last grows weary and is obliged to let them through.

The intestines, in common with the stomach, consist of three coats or layers of membrane,—the *outer* or *peritoneal*, the *middle* or *muscular*, and the *internal*, *mucous* or *villous*. The outer, by its smoothness, firmness, and moisture, readily permits of those changes of place among the bowels which are produced by breathing, exercise, and different degrees of digestion in the bowels themselves. When the food passes into the intestines it is, at the beginning of the small intestine, mixed with two liquids, the bile from the liver, and the pancreatic juice from the pancreas,—a gland which lies across the spine just underneath the stomach; the ducts or channels from the liver and pancreas join into a common duct which enters the duodenum (the first 12 inches

of intestine) a few inches below the stomach. After it has mixed with these juices the chyme divides into two portions: one of these is called *chyle*, and is liquid, the other being a thick yellow residue. In the small intestine both of these portions are mixed with another juice which is secreted by the intestine itself. The chyle passes along the small intestines and bathes the little velvety processes called villi, which thickly cover the whole mucous membrane. In these villi are *capillaries* or minute blood-vessels, and *lacteals*, tiny tubes, the use of which will be described presently. In passing along the small intestines the chyle bathes these villi, and the most liquid part of it passing through their walls is taken up partly by the little blood-vessels, partly by the lacteals. That which gets into the capillaries passes at once into the blood, and is carried to the liver through what is called the *portal* vein. The chyle which gets into the lacteals is still called chyle. Thousands of these little pipes, called lacteals, come from all parts of the intestine and gradually join into larger pipes, which at last all end in one called the *thoracic* or chest *duct*, by which the chyle is conveyed nearly straight up along the spine till the duct reaches the upper part of the chest, where it crosses to the left and opens into a vein under the collar-bone—the subclavian vein. The two subclavian veins unite into the left innominate vein, and the two innominate veins unite to form the *superior vena cava*, which enters the upper part of the right side of the heart at the same point as the *inferior vena cava*.

I said that besides the chyle there is in the small intestine a thick yellow residue; with this is mixed a quantity of waste matter thrown out of the blood through the walls of the small blood-vessels of the mucous membrane which lines the bowels; by this admixture the bulk and appearance of the indigestible portion of the food is changed to what we know when it is expelled from the bowels. When it passes into the large intestine it remains for some time in the cæcum, and becomes gradually more solid on its way through the large intestine.

The action of the bowels is helped by the air which they contain, some of which formed the air bubbles of the saliva and was swallowed with the food, while some is the result of gases evolved from the food during digestion.

The usual quantity of saliva secreted during twenty-four hours is three pints, and that of the gastric juice has been estimated at no less than fourteen pints; but the quantity varies considerably from various causes, one of which is the kind of food taken. The appearance of a favourite article of food is apt to make the mouth water; by this we know that food which is enjoyed is more easily digested than food which is not liked, for there is a sort of sympathy between the salivary glands and the gastric glands, so that we can be pretty sure that when our mouths are watering we are also secreting plenty of gastric juice. The quantity of gastric juice secreted bears a direct relation to the quantity of food required by the system; hence if too much food is eaten some of it remains undigested, because the stomach is unable to secrete enough for the solution of the whole.

One cause of eating too much is eating too fast, because under this condition there is not long enough time allowed for the secretion of the gastric juice and its mixture with the food; hence the state of the stomach is unnatural, and its nerves do not receive the same impression nor give the same alarm of "you have eaten enough," which they do when the gastric juice and the food are properly proportioned and mixed together. Another evil of hurried eating is that sufficient time is not allowed for properly chewing the food, and if this is not done, in the first place, the food is not properly divided by the teeth nor mixed with the saliva, so that it reaches the stomach in too hard a condition; secondly, as the saliva has not penetrated every part of it, the starch in the food has not been acted upon by the ptyalin and changed by it into grape-sugar, but passes into the stomach undigested and indigestible by it, though there is reason to believe that when it reaches the intestine it is at any rate

partially digested by the action of the pancreatic juice and bile.

Having thus briefly reviewed the functions of the digestive organs, I may say a few words as to their hygiene. The first necessity for a good digestion is good teeth, but these organs are too often neglected from childhood upwards. To keep the mouth healthy is essential, and in infancy the gums should be washed after each meal with the corner of a silk handkerchief dipped in water, in which a pinch of borax is dissolved. During childhood the teeth should be cleaned night and morning with a badger's hair brush, which should be replaced later on by a moderately hard bristle brush. In addition to this a thread of white silk should be passed between the teeth daily, in order to remove particles lodged between them which the brush cannot reach. It is difficult to keep the teeth in good order without some dentifrice, which, in order to prevent decay, should be antiseptic, alkaline, and rather gritty; for the causes of decay in teeth are: (1) sepsis; (2) acidity of the saliva; (3) lodgment of particles of food. A simple powder which answers every purpose is:—

Prepared chalk	1 ounce
Castile soap	1 drachm
Eucalyptia	20 drops

Or a very excellent powder may be made as follows:—

Boric acid (finely powdered) . .	40 grains
Chlorate of potash	½ drachm
Powdered guaiacum . . .	20 grains
Prepared chalk	1 drachm
Powdered carbonate of magnesia .	1 ounce
Attar of roses	½ drop

The dentifrice I generally use and recommend myself is the Odourine Dentifrice, made by Mr. J. Shipley Slipper, of 37 High Holborn, who is a clever and scientific dentist, and has mixed it, as the artist did his colours, "with brains."

The two popular dentifrices, camphorated chalk and carbolic tooth powder, are injurious, causing the teeth to become brittle and crumble.

From about the third year of life a periodical visit should be paid to the dentist—say every three months—in order to have the teeth inspected and anything done that may be necessary. It is a good plan to wash out the mouth and gargle the throat night and morning with water just tinged to a pink hue with permanganate of potash. This keeps the gums healthy and is a preventive of infectious and other throat diseases. If proper care is taken of the teeth they ought not to be lost by decay; but when the loss of teeth interferes with mastication they should be replaced by artificial ones.

If the teeth are in order and the food properly masticated, the work of the stomach becomes comparatively easy. Food should be taken slowly, and neither very hot nor very cold. Both body and mind should be in a tranquil state, and exércise of either should be avoided both immediately before and after meals, as it tends to draw blood away from the stomach, where it is required for the work of digestion, to other parts of the body.

As regards quantity of food, the best guide is one's own feeling on the subject. The quantity required varies with the amount of work done, with the state of the weather, and with the state of the mind. The safest rule is to eat when hungry and only then; to drink when thirsty and only then; and to cease eating or drinking at the first feeling of satisfaction. No greater mistake can be made than to eat until there is a sensation of fulness.

If food is taken only in sufficient quantity, well masticated, eaten slowly, and proper time allowed for the stomach to do its work, digestion in the bowels goes on in a healthy and natural way; but if these rules are not followed, or, if by tight lacing the stomach and bowels are not allowed room to perform their natural movements, digestive disturbance is

set up. Then the sufferer flies to aperients and thus gets more deeply into trouble, for if aperients are habitually taken the organs fail to operate without the accustomed stimulus, and chronic constipation is the result. Saline aperients frequently taken are perhaps the most harmful, as they tend to injure the mucous coat of the stomach and bowels. People would hesitate to attempt to set a valuable watch in order, but if the public that swallows patent pills with avidity would only consider that they are experimenting with drugs of which they know nothing on the most complex and precious piece of mechanism that exists, we should hear no longer of the colossal fortunes made by the Holloways of this and past generations. "For every ill Try ——'s pill" is a motto which many a man seems to have taken for his own; but if a little more reason and a little less faith were exercised in this matter, indigestion would not be the national disease.

When an aperient is necessary it is best to take an active purgative such as castor oil, a single large dose of Epsom salts, or the old-fashioned blue pill and black draught, and then to remodel the dietary.

The introduction of that seductive laxative, cascara sagrada, has, I think, done a considerable amount of harm. For some time it has been the fashion in the medical profession to recommend to patients the nightly use of this drug, with the remark that it is a drug which does not lose its effect when taken constantly. I have found, however, that as a rule the effect is lost in from six weeks to as many months, the dose having to be frequently increased. In cases where strong aperients are counterindicated, and yet something of the kind is required, this drug is useful, and can often be given with good results when the stomach and bowels are irritable, and in cases of gastric catarrh, where much bismuth has to be given and there is constipation. The soap and water enema is an old-fashioned remedy, which if frequently repeated is highly injurious to the mucous

coat of the bowel; but to glycerine injections the same objection does not apply, and glycerine may be frequently used, even for young infants, without doing any harm. The glycerine suppositories made by Burroughs, Wellcome and Co. are very satisfactory as a stimulant to the action of the lower bowel. A glass of hot water at bed-time and the first thing in the morning is most serviceable in constipation, and when there is a tendency to this trouble brown bread should be eaten in preference to white, and oatmeal porridge, salad mixed with oil, plenty of fruit, nuts, and green vegetables should be taken.

It is very important to make a practice of attending to the calls of nature at the same hour every day, and medical men ought to be careful to emphasise the necessity for this in the education of young children. This habit once formed goes further than almost any other to ensure the health of the body.

Constipation and consequent straining is the commonest cause of piles, a painful, distressing, and exhausting local complaint, which is so extremely prevalent that it may be considered as a frequent cause of deterioration of the general health—a cause which, owing to its unpleasant nature, patients are apt to conceal, and which is generally not revealed to the doctor until an operation has become necessary. When there is any tendency to piles it is necessary to avoid constipation, keep the lower bowel free, and ensure absolute cleanliness. During an attack a teaspoonful of flour of sulphur, taken in milk every night at bed-time, gives great relief, and in order to avoid all straining two or three ounces of warm water should be injected with a small rubber syringe before every motion; this should be repeated immediately afterwards, and the part bathed with wool or paper soaked in hot water. No printed or coloured paper should ever be used, and the sufferer should avoid sitting on cold seats or damp grass.

Hazeline cream ointment should be kept constantly applied,

and an injection of a dessertspoonful of Hazeline in two ounces of warm water should be used two or three times daily while lying down, so that it may be retained. Great comfort and relief are obtained by this simple method of self-treatment even if it fails to cure. Massage of the region of the liver and bowels and cold compresses are of service in constipation and piles.

Chronic constipation is a very general cause of ill-health in women, and very frequently arises through neglect at boarding-schools. The medical attendants of schools should not fail to impress upon the teachers the importance of looking after their pupils in this respect; no false modesty should be allowed to interfere with what is a matter of such vital importance.

CHAPTER VI

FOOD AND DIET

Having very briefly described the structure, functions, and hygiene of the digestive organs, let us pass on to consider the material upon which they work.

Food is matter derived from the outer world, which, by the process of digestion and absorption, is converted into blood, from which every tissue of the body draws its supply of nourishment, and without which the brain is not capable of producing thought or volition. Food is matter by the assimilation of which the waste of the body may be repaired, its substance daily renewed, and which in children supplies the material for growth. It follows, then, that to be foods substances must be capable of assimilation by the digestive organs, and that they must contain the chemical elements of which the body is composed.

The various parts of the body differ among themselves in composition, and, therefore, one food element goes more especially to feed one part, and another to a different organ; injury is done if the diet is deficient in one or more kinds of food element; hence the necessity for a mixed diet, for milk and eggs are the only substances that contain in themselves all the materials necessary to build up the animal body, and milk, after the first year or so of life, becomes embarrassing to the digestion, because, being liquid, it does not call into play the muscular coats of the stomach. Eggs, moreover, can hardly be called a food satisfying all the

necessities of the human being because of their exceedingly concentrated form, and because they possess an insufficiency of water. Water is, perhaps, the most important food substance. The blood contains 79 per cent of it, and other foods are not well digested if the supply of water is insufficient. In one thousand parts of human milk no less than eight hundred and ninety parts consist of water.

If we take as an example a full-grown man weighing 11 stones (154 lbs.), we find the weight made up of water, 88 lbs.; of solid matters, 66 lbs. The solid matters are made up of the elements oxygen, hydrogen, carbon, nitrogen, phosphorus, sulphur, silicon, chlorine, fluorine, potassium, sodium, calcium, magnesium, iron, and traces of other metals. All these substances, which may be divided into proteids, amyloids, fats, and minerals, are found either in the blood or in different proportions in different tissues. Thus iron is found in muscle or flesh (red meat), and in smaller proportion in the other tissues. Salts of lime, and especially the phosphate, are necessary for all the tissues, but more particularly for the bones and teeth.

Phosphoric acid is constantly found in living tissues, but the chief seats for phosphorus are the brain and nerves, so much so that there is a German saying, "Ohne Phosphor kein Gedanke" (no thought is possible without phosphorus). Salts of magnesium are also found in the body, and salts of potassium are found in large quantities in the red corpuscles of the blood, where iron also exists. In that common complaint, anæmia, manganese and iron are deficient, and the red corpuscles of the blood are sensibly diminished in quality and number. The serum or watery part of the blood contains salts of sodium.

To return to our full-grown man. In the ordinary work of life his body would lose in twenty-four hours, while doing work, equal to 450 foot tons :[1]

[1] A foot ton is the equivalent of work necessary to lift one ton one foot high.

Of water about 40,000 grains, or 6 lbs.

Of solid matters about 14,500 grains, or over 2 lbs.

Of heat as much as would raise 8700 lbs. of water from 0 to 1° Fahr., which, calculated in work, is equal to 3000 foot tons.

Among the solid substances lost would be carbon, 4000; nitrogen, 300 grains; mineral matters, 400. The equivalents of loss and gain can be supplied as follows:—

Necessary nourishment	Grains.	Supplied by	Grains.
Proteids	2,000	Lean beef steak	5,000
Amyloids	4,400	Bread	6,000
Fats	1,200	Milk	7,000
Minerals	400	Potatoes	3,000
Water	36,500	Butter, dripping, etc.	600
		Water	22,900
	Total, 44,500		Total, 44,500

or about seven lbs.

Other foods can, of course, supply the necessary ingredients as well as those given above in my second column, which are set forth as examples merely. Of course, the amount of food that a person requires must vary according to his physique and height. Theoretically the right quantity is that which maintains the weight of the body unchanged during a life of moderate exercise.

The kind of food consumed makes a difference to the quantity, as some articles furnish much more nourishment than an equal weight of others. It has been found that a man of average size[1] in full health, and taking free exercise, on a diet of fresh meat, bread and butter, with water for drink, must, in order to keep his weight up to its normal standard, consume every day:—

[1] The observation was taken from a smaller man than the one imagined above.

	lb.	oz.
Meat	1	0
Bread	1	3
Butter	0	$3\frac{1}{2}$
Water	3	8

that is to say, rather less than $2\frac{1}{2}$ lbs. of solid food, and rather more than three pints of liquid. These quantities would, of course, be exceeded if less nutritious substances, such as rice, potatoes, or fruits formed any considerable part of the diet.

I will now give a simple classification of food substances which may be useful for future reference :—

1. *Inorganic Food Stuffs.*

(*a*) Water : a compound of hydrogen and oxygen.

(*b*) Mineral salts, such as chloride of sodium (common salt). Salts of potash and of iron, etc.

2. *Organic Food Stuffs divided into—*

(*A*) *Non-nitrogenous* food stuffs, compounded of carbon, hydrogen, and oxygen, as follows :—

(*a*) Fats and oils, obtained from animals and plants.

(*b*) Carbohydrates or amyloids, such as sugars, starches, gums, and woody fibre. These have a larger proportion of oxygen than fats and oils.

(*c*) Miscellaneous : alcohols and ethers, and certain vegetable acids, especially citric acid (from limes), tartaric acid (from grapes), malic acid (from apples).

(*B*) *Nitrogenous food stuffs*, composed of carbon, hydrogen, oxygen, nitrogen, and sometimes a little sulphur and phosphorus.

(*a*) Albumenoids or proteinoids, or proteids, such as albumen (white of eggs), fibrin and syntonin (contained in meat), casein (in cheese, etc.), gluten (in some grains), legumin (in beans and peas).

(*b*) Gelatinoids, such as gelatine, chondrin (from cartilage), and osein, from bones.

(*c*) Miscellaneous, such as certain vegetable alkaloids; for example, theine, caffeine, theobromine (the alkaloid of cocoa), and many others.

When we examine the diets of different persons or races they are found to agree very much in chemical composition. A due mixture of nitrogenous and non-nitrogenous foods is required, and starvation results if the attempt is made to live upon one class alone. Even carnivorous animals in their nitrogenous flesh food get non-nitrogenous fats, but in order to get carbon enough they have to eat a great quantity. We get iron indirectly in almost all our foods. Phosphates we get generally from grains and cereals, but also in flesh, and carnivorous animals get them from bones. Salts of potash we get from vegetables, which absorb them instead of chloride of sodium, and salts of sodium we get chiefly in the form of common salt (chloride of sodium), which is a necessary addition to our food. It also acts as a condiment by increasing the flow of the saliva, and probably is the source of the hydrochloric acid in the gastric juice necessary for digestion in the stomach.

Now, in order to show what I meant when I said that milk is a perfect food, I will give the average composition of milk in 1000 parts.

	Human.	Cows'.
Water	890	858
Solids—(*a*) *Nitrogenous* (casein, etc.) . .	35	68
(*b*) *Non-nitrogenous* fats, butter, etc.	25	38
Sugar of milk, etc. . . .	48	30
Minerals	2	6
Total,	1000	1000

From the above table it will be seen that although cows' milk contains all the ingredients necessary to a perfect food, it does not do so in the same proportions as the natural

food of the human infant, and in bottle-feeding it is therefore necessary to make certain changes in the cows' milk according to the age and condition of the child, the principal of these changes being the addition of water and of sugar of milk. The composition of human milk also differs with the age of the infant, becoming less watery and richer as the child grows and its digestive powers develop.

The quantity of food required to nourish the frame during the twenty-four hours depends greatly upon the age of the individual, the climate in which he lives, the amount of clothing worn, the energy expended in bodily or mental action, and many other conditions. In proportion to their size children eat immensely more than grown people, and they need to do so because they have to build up their frames, as well as to supply the waste of every day.

It has been averred that a boy in Greenland will drink a gallon of train oil and eat four pounds of candles in the day, and the appetites of the Esquimaux are prodigious. A rhesus baboon, in proportion to his size, eats more than a wolf; but it must be taken into consideration that he is a vegetarian, while the wolf is a flesh-eater, and thus takes his food in a more concentrated form. A ceboo monkey will swallow his own weight in bananas, and four men have been known to devour a whole sheep at one sitting. A case told me by a friend was that of an English schoolboy who was of a very greedy disposition. One fine day he was provided with an enormous dish of suet dumplings in order to see how much he could really eat. He ate continuously for a long time, and then complained of feeling sleepy, and asked to be allowed to lie down on his bed. This request was complied with. After some hours, as the boy did not come down, he was sought and found lying quite dead, having fallen a victim to an overloaded stomach. Such cases are fortunately rare, and much more frequent are those in which it seems perfectly marvellous how little the glutton suffers for his sins. The mandarins in some provincial capitals of Northern China,

where banquets of forty courses are considered the right thing, eat enough to send a boa-constrictor to sleep for a week. Vitellius, the Roman Emperor, of gluttonous notoriety, used to eat through matches of fourteen or fifteen hours in length, although, as students of history will remember, he took means to clear his stomach and so start afresh every now and again. Dr. Robert Moffat says a bushman will eat twenty pounds of hippopotamus liver, a bucketful of broiled marrow, and sundry handfuls of ground-nuts, parched corn, and blackberries, in less than twenty-four hours. Several tribes of Northern Brazil eat clay almost with impunity.

Certain kinds of food become, as it were, national dishes. Thus the Yakoots live on fish and seal-blubber; the Shoshones prefer bull beef; the Namaqua Hottentots live almost entirely on venison. National dishes are also the beef of old England, the potato of Ireland, the haggis and oatmeal porridge of Scotland, the sauerkraut and sausage of Germany, the Spanish onion, and the macaroni of Italy.

In individuals preferences are shown for certain kinds of foods, and the same people who like one kind of food when young get to hate it in after years. The sugary messes which are the delight of the child are nauseous to the grown man. In many cases I believe that the desire for certain kinds of food undoubtedly indicates a physical want. Thus in children who lose heat more rapidly than adults, the sugar for which they evince a craving supplies heat, by its oxidation in the body, and I believe that in many cases of so called "morbid craving" physiological urgence is the real cause. Take for instance the following five cases which have come under my notice :—

1. A girl aged fourteen had a craving for lemon juice, which she drank till a pathological state of the blood was produced.

2. Another girl the same age would eat nothing but raw oatmeal.

3. A young lady aged eighteen hides soft slate pencils and eats them constantly, she dates the habit from her college

days; she buys the pencils when they are not at hand, but conceals her habit from every one.

4. M. N. has a longing for charcoal and chalk, which articles she eats on every opportunity.

5. F. W. at the age of sixteen began to have an intense craving for raw ground rice, of which she ate on an average half a pound a day, sometimes more, not caring for any other food. She knew it was bad for her, and tried to stop it, but took to eating it raw, unground. This lasted for two years, and at the age of five-and-twenty she could hardly restrain herself, and said, "If I go to a corn-dealer's it is all I can do to keep from eating it out of the mouths of the sacks round me."

In the first case the habit of taking lemon juice probably originated in deficiency of gastric juice, while in the other cases I have little doubt but what the craving for gritty material arose from atonic dyspepsia, the gritty and indigestible particles serving to irritate the mucous membrane and nerve endings, and so stimulate muscular contractions of the stomach and bowels and assist the digestion of food. Thus I banished the craving to which case 5 was subject by recommending her to take brown bread instead of white, oatmeal porridge for breakfast, and a piece of oat-cake when she felt the craving. There has been no return of it for four years.

Just as there are likings for certain kinds of food, so are there also national and individual antipathies to various kinds of food. The Persians call asafœtida "the food of the gods," but the English are inclined to fly from the very smell of it, and even hesitate to mention the name, so disgusting is it to them. Some people cannot eat strawberries, while to others oranges are abhorrent. A friend of mine has such an intense aversion to apples that she cannot bear even to see another person eating one. The same feeling was shared by Vladislas, king of Poland, who became much excited whenever he saw an apple. The celebrated Scaliger shivered at the sight of watercress. Eggs bring a bilious attack on some people, while the system of others shows its resentment to such

articles as shellfish, raspberries, or caviare by an attack of nettlerash,—the same result following each ingestion of the obnoxious food.

The case is on record of a gentleman on whom mutton acted as a kind of irritant poison, producing vomiting and other signs of digestive and nervous disturbance. That it was not mere fancy in this case was proved by experiment, as mutton was given to the patient without his knowledge in all sorts of disguises, even in a fruit pie; but in every instance it produced the same unpleasant effects, and the medical man, in whose practice the case occurred, maintains that if he had been forced to eat any considerable quantity of mutton it would probably have killed him.

A medical man was once called in to a gentleman who was very ill, with marked signs of indigestion, having lost flesh and being unable to retain any food. "What have you been eating?" asked the doctor. "Crabs," was the laconic reply. "What, nothing but crabs?" "Nothing." "Do they agree with you so well, then?" "Agree with me! No! but that is just why I eat them. I'm not going to let my stomach get the better of me!" The cause of what had been considered a mysterious illness was thus easily discovered, and a rational diet soon restored the patient to health. Our bodily sensations should not be regarded as enemies to be overcome, but as valuable servants, who will be true to us as long as they are well treated. Idiosyncrasies such as these need to be studied. It is no good for a mother to say, "I mustn't let the child be dainty," or for the adult to insist, "I won't be conquered by my stomach." Depend upon it there is a physiological reason for such likes and dislikes, and, unless the sensibility of the stomach is injured by disregard of its warnings, it will prove a true guide as to the quantity and quality of food required by its owner.

CHAPTER VII

FOOD ADAPTED TO DIFFERENT AGES

The digestive organs of the young infant differ from those of the adult: (1) in there being no teeth; (2) in that there is no ptyalin in the saliva; (3) in the stomach being very small and not muscular, while its glands are less active; and (4) in the less activity of the liver and glands of the bowels.

The natural food for a young infant is, of course, the mother's milk, to the composition of which I referred in the last chapter. Nursing is the natural duty of every mother whose milk-supply is sufficient in quantity and up to the standard in quality. But, unfortunately, many infants have to be deprived of their natural rights owing to a deficiency of the milk or poorness in its quality. On this point medical men have two obvious duties. The first is, that they should use all their persuasive force in order to induce mothers who have a good milk-supply to nurse their little ones. I am sorry to say that many mothers need considerable inducement, as they are inclined from motives of vanity and convenience to delegate their duties to others, the infant suffering thereby; but the mere convenience of the mother should never be treated as a sufficient reason for bringing up the child artificially or by a wet nurse.

As to the second: many mothers who are anxious to nurse their children, and have a sufficient quantity of milk, have not the strength to produce milk of sufficiently good

quality; and it should be the duty of the medical attendant to examine the quality of the milk carefully from time to time with a view to ascertaining whether its component parts are up to the standard, and especially whether there is a sufficiency of cream.

The composition of human milk varies somewhat according to the age of the infant, and also according to the diet and strength of the mother. In some cases where wet nurses, who have habitually lived on a poor diet, are suddenly put on to a rich diet on entering their situations, the quality of their milk is so altered that the percentage of fat is increased, and the infant suffers thereby. When a wet nurse is engaged, therefore, it is best to keep her to her ordinary diet as far as possible. I do not, however, recommend the engagement of wet nurses, as it is attended by so many difficulties and discomforts, and science has now come to the fore to produce an artificial human milk, which, after some years' experience of its use, has been proved to be a most efficient substitute; and in fact many infants I have known who have been ailing owing to the mother's milk not agreeing with them, have, when put upon artificial human milk, thriven splendidly. A most careful and scientific preparation is the Humanised Milk which is sold in large quantities by the Aylesbury Dairy Company, and it was upon this that I reared my own infant with the most satisfactory results, so that I speak from personal conviction as well as from experience of hundreds of other cases. The Humanised Milk being placed in hermetically-sealed bottles, can be supplied to all quarters of the globe, and being prepared under the supervision of a skilled chemist it is superior to what one can make at home. This is undoubtedly the best food for all infants who from the birth are deprived of their natural nourishment, and a great deal of trouble and anxiety is avoided by its use, especially by those who are travelling about, as changes in milk always upset a child.

Diet from Birth to 10 *Months.*—Until the appearance of

the first tooth artificial human milk should be exclusively used, although to some strong children cows' milk, diluted with a certain proportion of water, which increases according to the age of the child, enriched by the addition of cream and sweetened with Compound Sugar of Milk (Mawson, Newcastle-on-Tyne), may be given ; but on the appearance of the first tooth greater variety is desirable, and it is a very good plan to give two-thirds milk to one-third of barley water, with the addition of a tablespoonful of lime water, unless it causes constipation.

After the age of seven or eight months "Frame Food Diet" may be given at alternate meals. "Frame Food" Extract, which gives the special nourishing value to "Frame Food Diet," is a preparation from the cortical layers of cereals, and is very rich in phosphates and iron, all derived from the wheat, no chemicals being used. It is strongly to be recommended as a food for women during pregnancy and lactation, and from personal experience I have reason to believe that if taken under these circumstances, the expenditure of phosphates, which very often leads to loss of teeth in the mother, and to toothache during pregnancy, may be averted. A clever dentist whom I am in the habit of consulting remarked to me on the curious fact that the substance of my teeth appeared to be harder under those circumstances than it had been previously, and when I suggested that the special provision I had made for the circumstances by dietary had something to do with it, seemed to consider this the probable cause. "Frame Food Diet" is a cooked food, in which starch has been converted to dextrine, and may be given freely to children from the age of eight months upwards.

The capacity of the infant's stomach should be a guide as to the quantity of food required. Rotch has, by actual measurements, proved that that of an infant of five days old will contain only six and a half fluid drachms. It has doubled its capacity by the end of the fourth week, and by the end of the eighth will contain three times and one-fifth as much, the

increasing size corresponding with the rapid growth during the first two months. During the third, fourth, and fifth months the increase is less rapid. The quantity of food should therefore be frequently increased during the first eight weeks, and then kept at about the same up to the fifth or sixth month, when it should be increased, as there is a considerable increase in the capacity of the stomach between the sixth and tenth months.

During the first week a child should take about one ounce every two hours. From the first to the sixth week from one and a half to two ounces should be given every two and a half hours. From the sixth to the twelfth week from three to four ounces should be given every three hours ; and from that time till the sixth month from five to five and a half ounces should be given ; at six months six ounces, and at ten months eight ounces, the interval between meals being still three hours during the day, but increasing in longer periods during the night.

Farinaceous foods of any kind must never be given before the fifth month, and very rarely before the seventh ; but it is hardly sufficiently recognised, even by medical men, that individual cases require special kinds of feeding, and that a food upon which the majority of children may thrive will be unsuitable to a small minority. Condensed milk should not be used as an entire food for infants, but the good brands, containing all the cream, often form an excellent temporary food in cases of sickness and diarrhœa when largely diluted with water and lime water. When this is given it is well to give a teaspoonful of raw-beef juice every hour, as this prevents the scorbutic tendency of condensed milk.

Peptonised milk is very useful in many cases where the children have difficulty in digesting other milk, and may be continued for some weeks, but peptonised milk should not be given as a sole diet during infancy, as the stomach should be encouraged to do its work by itself, and not to become inactive through being supplied with partly digested food.

After the teeth begin to appear the child should be encouraged to masticate in order to assist their development; and a small piece of underdone beef steak or hard crust is an excellent thing to cut the teeth upon, if precautions are taken against choking through drawing it into the throat.

Diet from 10*th to* 18*th month* may be as follows:—

First meal, 7 A.M.—Eight ounces of "Frame Food Diet," made with milk. *Second meal*, 10 A.M.—A breakfast-cupful of bread and milk or a teacupful of milk with some bread and butter, or the yolk of an egg lightly boiled, with bread crumbs and a teacupful of fresh milk. *Dinner*, 2 P.M.—Beef-tea, mutton broth, or chicken or veal broth, with bread broken up in it, or a potato mashed with butter and egg, and given on the day when egg is not given at any other meal, or potato moistened with four tablespoonfuls of beef-tea, or boiled white fish carefully picked over with the fingers to see that there are no bones in it, with bread and butter, or potato and butter, and milk to drink. This may be followed by a large tablespoonful of milk pudding.

Fourth meal at 6 P.M.—"Frame Food Diet." *Fifth meal* at 10 P.M.—A tablespoonful of that good old-fashioned food, Flour Ball, in a breakfast-cupful of milk.

Food for young infants should always be given about the temperature of the blood, and the best feeding-bottle is Burroughs, Wellcome and Co.'s Thermo-Safeguard Feeding-Bottle, which should be used with boat-shaped fittings. Its advantages are, that it shows the temperature of the milk by means of a thermometer moulded into the glass, and that it is marked in ounces so as to show the quantity taken, and is very easily cleaned. Long-tubed bottles should never be used.

Diet from 18 *months to* 2½ *years.*—From eighteen months four meals a day only are necessary. *First meal*, 7.30. A.M.—Bread and milk should be used ("Frame Food Bread," which is made specially nourishing by adding "Frame Food" Extract to white flour), bread and butter, or a tablespoonful of

oatmeal porridge sweetened with milk sugar; milk to drink. *Second meal*, 11 A.M.—A teacupful of milk, with biscuits, or bread and butter and fruit. *Third meal*, 2 P.M.—As before, or one tablespoonful of underdone mutton pounded to a paste, with bread and butter, or mashed baked potato moistened with good gravy, followed by milk pudding. *Fourth meal*, 6.30. P.M.—Bread and butter and milk, "Frame Food Diet," custard pudding, hominy, or other plain wholesome pudding.

In preparing food for children of this age, meat or chicken should be pounded to a paste with a pestle and mortar. Potatoes should be baked in their skins until the inside is quite floury, and scooped out. Food should be served on a hot-water plate, as many children find it distasteful when half cold. Milk should not be given undiluted when any preparation of meat forms a part of the meal. At any time under two years, if the child appears to suffer from indigestion, a return should be made to a plain milk diet, to milk diluted with barley water, or to some simple malted food. Some children thrive well on a purely milk diet up to the age of two to two and a half. Even in early infancy an occasional drink of water, not too cold, should frequently be given. Quite little infants sometimes cry for thirst, and should have water instead of a meal if meal time has not come.

Diet for children above the age of three should be more varied, though still plain; and before from seven to ten years it is not wise to make a practice of giving as a rule either tea, coffee, or any alcoholic liquor. Milk and water should be the chief drinks; but in winter Schweitzer's cocoatina made with milk forms a most useful addition to the dietary. This preparation is lighter and more digestible than ordinary cocoas, and has been deprived of the objectionable oily substance found in common cocoa. The diet should be, roughly speaking, as follows:—*For breakfast*—Milk porridge or gruel, with bread and butter, should always be given, which may be followed either by fresh fish or an egg or stewed fruit. *For*

dinner—Soup, roast or boiled meat, cut into small pieces, potato, spinach, cooked celery, cauliflower, peas or French beans may be given, followed by some milk pudding or suet pudding. *For tea*—Milk and water with some pudding, or bread and butter and marmalade or some suitable jam; and for *supper*, bread and milk or cornflour.[1]

In giving fruit and jams to young children, the skins, stones, pips, and little seeds must be avoided. Thus raspberry jam is unfit for children, but raspberry jelly may be given. As to quantity, if a young child eats slowly and bites each mouthful thoroughly, limitations need not be made, but children should on no account be allowed to bolt their food. No condiments should be given but salt, and all highly-seasoned dishes should be avoided. Sweets and cakes should be given sparingly.

Diet during the school-going age should be abundant in quantity and suitable in quality. Poor food and ill-cooked food is unfortunately too frequently given at school, and cases of chronic indigestion are often the result. I am sorry to say that I have seen a large number of young girls whose health has suffered for many years from the improper feeding to which they were subjected at foreign boarding-schools, and parents should be most careful to ascertain that the food at school is good in quality, sufficient in quantity, and properly cooked, for good food is frequently rendered indigestible by being badly cooked.

The practice of giving lessons before breakfast is a great mistake, and where lessons are given before the ordinary breakfast, pupils should be allowed to take hot milk and bread before going to them. Roughly speaking, the following dietary is fairly good.

[1] It is noteworthy that cornflour can be made very nourishing and tasty by a small addition of the "Frame Food" Extract of Wheat already referred to. A useful book of recipes may be obtained free from the Frame Food Company, Limited, Lombard Road, Battersea, London.

Breakfast, about 8 or 8.30.—Porridge, bread and butter, coffee and milk, with either meat, fish, or eggs, and marmalade or other preserve.

Dinner, 1 or 1.30.—Meat, potatoes, and green vegetables, haricot beans or pease pudding, followed by milk pudding, suet pudding, or occasionally pastry.

Tea, 5 to 6.—Schweitzer's cocoatina, bread and butter, eggs or fish, marmalade or jam.

Supper.—Milk and biscuits. Beer or other alcoholic liquors should not be given unless ordered by the medical man. Whole-meal bread is preferable to ordinary white bread, and "Frame Food" Bread, which contains all the nourishment of the wheat without the husk, is better than either. Plenty of milk should be given. Meat should be given twice daily, and should be equal to one pound of uncooked meat during the twenty-four hours—that is, about nine and a half ounces of cooked meat. Delicate children who do not take their food well should have a little beef-tea for lunch at. 11 A.M. Children should never be allowed to purchase comestibles for themselves, as much injury to the digestion is done by eating sweets, cakes, and pastry between and before meals. Pastry, puddings, and jam should form part of the daily food, and cake be given occasionally, with tea, in order to prevent outside excursions after dainties. A very nourishing, palatable, and cheap substitute for jam is the "Frame Food" Jelly, made of the "Frame Food" Extract, boiled up with pure cane sugar. It can be eaten on bread or in puddings.

The habit of sending hampers to schools for the use of the children should be as far as possible discouraged. Chocolate or cocoa may with advantage be given instead of tea or coffee, as it contains more nutriment. Four meals a day, as indicated, are desirable during adolescence.

Food for Adults.—The practice of taking meals at regular fixed intervals should, as I have indicated, be adopted from the earliest age, and in arranging these intervals we should bear in mind that the rapidity of digestion varies at different

ages, in different persons, and even in the same person under different conditions. As a general rule from three to four hours is required to digest an average meal, but some meals and some kinds of food require a longer time, while other kinds of food may be digested in a shorter time, remaining in the stomach only from one and a half to two hours, as shown in the well-known case of Alexis St. Martin, a man the workings of whose stomach were examined through an aperture left by a gunshot wound.

An adult in average health requires as a rule only three meals a day, and these may be arranged as follows :—Breakfast, 8.30; lunch at 1.30; dinner at 7. In country places, where dinner is taken in the middle of the day, a light tea is taken at 5, and supper at 8, and when there is late dinner a cup of tea may as a rule be taken, without eating, at 5 o'clock. In cases of flatulent indigestion, however, the taking of tea should be rigorously eschewed, and tea should never be allowed to infuse for more than four minutes.

The tendency in adults is very much towards over-eating, for, as I have said, food is not required in the adult body in order to supply growth, but only to replace waste of tissue. It is therefore evident that those who lead a comparatively idle life without much exertion, either mental or physical, require very much less food than those who are engaged in active occupations. A substantial breakfast is desirable for all busy people, but the nature and quantity should depend very much on the occupation. Business men who have to be moving about much in the middle of the day should not take heavy luncheons, but should make their chief meal in the evening.

The practice of taking soup at the beginning of dinner has often been objected to, because it is said that the liquid dilutes the gastric juice. It is, however, based on a sufficiently scientific principle, as when a small quantity of strong good soup is taken, the liquid part, being rapidly absorbed into the blood, refreshes and stimulates, and prepares the way for

more solid food. The fact that it is best to take light articles of food first, and the more solid ones later on in the meal, was fully recognised as long ago as the twelfth century by Maimonides, a Jewish physician, who wrote a long treatise on digestion, and recommended this principle. Sufferers from indigestion, however, often find that they cannot take soup, and these should also avoid taking strong tea or coffee after dinner, as they retard the process of digestion. A cup of hot water sipped very slowly an hour or two after dinner is sometimes found to aid digestion in a very satisfactory way. Some persons who have slow digestions do best with very long intervals between their meals. These benefit considerably by taking PEPSALIA with their meals, which assists digestion. Others need food more frequently, and if they do not have it at frequent intervals the appetite passes off, and they are unable to eat and grow weak. Feeble persons who do not take a large quantity at each meal need to eat very frequently, and a biscuit with a little milk and lime water at 11 A.M., a cup of cocoatina with a little bread and butter at 5, and beef-tea, gruel, or arrowroot before going to bed are, in these cases, often useful additions to the ordinary dietary.

As a rule women require less food than men, as their bodies are smaller, and they do not generally lead such active lives; but they very often injure their health seriously by living principally on tea and toast, cakes, and other innutritious articles of diet, when they have no male relatives present to stimulate them by the force of example into taking more nourishing articles of food. Again, young girls often think that it attracts interest to eat but little, and the first signs of this tendency should be severely checked by parents, as it often becomes a hysterical tendency, and goes on increasing. Women require plenty of albuminous food to repair the losses of strength after childbirth, menstruation, or any other loss of blood, and special dietary has to be arranged for them during pregnancy and lactation.

Food in Old Age.—Elderly persons of either sex are, as a

rule, unable to digest or assimilate food in the same way as in their younger days, owing to the progressive degenerative changes in the glands, and lessened absorbent power in the alimentary canal. Circulation being languid, the action of all the functions is delayed, the muscular walls of the intestines lose their tone, and constipation and flatulence often occur. In these cases massage of the bowels is very useful in order to stimulate the action of the intestines. Loss of teeth in old people is also a frequent cause of the impairment of the digestion, so artificial teeth should either be supplied, or meat and solid articles of food should be well cut up before being taken, and PEPSALIA is a valuable adjunct to meals. The amount of food taken at a time should be small, and the intervals between meals rather short. When, as in many cases, it is the habit to wake about 4 o'clock in the morning, a little food, such as a cup of cocoatina, or warm milk, or beef-tea, will often ensure sleep afterwards.

Breakfast should consist of an egg, fish, sweetbread, or chicken. A cup of beef-tea may be taken with bread at about 12, *dinner* at about 4, and a light meal at about 8 P.M., to consist of "Frame Food Diet," or other food made for infants and invalids, bread and milk, cocoatina, and bread and butter, or some light pudding. All farinaceous foods should be submitted to high temperatures for some time, so as to render the granules of starch easy to digest, for, owing to the lessened activity of the glands and lessened power of mastication, the food in old people is, like that of young children, not sufficiently subjected to the action of ptyalin in the mouth. It is for this reason that infants' foods are of such service for the aged. Stewed celery and cooked Spanish onions are very nice for old people, and I have known old gentlemen take Spanish onions cooked in milk habitually for supper, saying that this induces sleep. Meat may be minced or pounded to a paste. Beef-tea and milk should form a large part of the dietary; but pastry and raw fruit can rarely be taken. The acidity of some fruits may be neutralised by

adding a little bicarbonate of soda to them—about as much as will cover a shilling to each pound of fruit to be added while stewing; and milk sugar is better for sweetening than cane sugar. Cane sugar produces an acetic-acid fermentation, and milk sugar a lactic-acid fermentation more closely allied to the natural acid of the stomach. The best kind to use is the Compound Sugar of Milk prepared by Messrs. Mawson of Newcastle-on-Tyne. In this preparation the milk sugar is combined with phosphates so as to nourish bones, nerves, and brain. A similar preparation is the Cerbos Salt, a pure table salt combined with phosphates, to be used for all purposes for which ordinary salt is used, and which is of great value to the young, to brain workers, and all those suffering from nervous exhaustion. The use of some kind of condiment is often of service, and caviare, smoked cod's roes, the roes of salted herrings, and bloater or anchovy paste, are serviceable, as what the Italians call *anti pasto*, to increase the activity of the stomach before the meal. Fat is best given in the form of cream or butter.

CHAPTER VIII

DIET FOR DIFFERENT TEMPERAMENTS AND DISEASES

All the substances needed in food can be obtained either from the vegetable or animal kingdom. The albuminates, carbo-hydrates, fats, and mineral substances are all found both in animals and vegetables, but in varying proportions. The albuminates and fats which are derived from animal foods, as in meat, fish, eggs, and milk, are almost entirely absorbed in the stomach and intestines; but the albumen of vegetable substances is generally associated with large quantities of starch enclosed in a network of cellulose or woody tissue which resists the action of the digestive organs. Therefore, while only about 3 per cent of the albumen of animal food is undigested and lost, as much as 17 per cent of vegetable food is wasted and passes away with the excretions. Therefore, if only as much vegetable food were taken as would give the actual amount of albumen, salts, and starches required for the daily waste of the body, a large proportion would pass away undigested, and what is assimilated would not be sufficient to sustain the body. A larger quantity of vegetable than of animal food is requisite to give the amount of nourishment required; a mixed diet is therefore necessary.

The study of dietetics may be made sufficiently scientific to adapt the food to the individual case, although in health and disease the nutrition of the body is changed according to the proportion of the animal or vegetable food taken.

An excess of animal food increases the amount of fibrin in the blood, enriches its corpuscular elements, and increases the proportion of phosphatic and mineral constituents; gives firmness and tone to the muscles, and leads to the disappearance of superfluous fat. On the other hand, an excess of vegetable food increases the amount of fatty deposit, and causes obesity. Food rich in nitrogenous elements would tend to increase the amount of oxidation which goes on in the body, and to lead to an increase of oxygen being absorbed by the breathing organs. Probably due to this action, the fat deposited in the tissues is oxidised, and this also helps to make a flesh diet the remedy for obesity. Under a diet largely consisting of animal food the urine and amount of urea it contains is increased, and it is rendered rather more acid.

It is more stimulating than vegetable food, and seems to satisfy hunger more completely and for a longer time, the reason for this being that the albuminates are digested in the stomach and generally absorbed in that organ, entering more quickly into the general circulation than vegetable foods which are digested almost entirely in the small intestine.

Diet for different Temperaments.—There is no doubt whatever that mental as well as physical characteristics may be altered by the quality of the food taken. Animal food increases the activity of the nervous system, and may therefore be given more largely to those of a phlegmatic temperament than to those who are highly excitable.

With regard to children and all young people, it is desirable when the nerves are in a highly excitable state, that a diet consisting mainly of vegetable foods, milk, butter, and eggs should be given, while strong meats, tea, coffee, and highly-seasoned foods should be avoided, and alcohol eschewed as if it were a poison. In the case of dull, slow children who are inactive mentally and physically, the diet should consist more largely of meat and fish, and tea and coffee may be given from the age of four years. In children of a consumptive tendency, the diet should consist to a large extent of fats and carbo-

hydrates, cream, butter, fat bacon, and the cream of malt, with cod-liver oil (Oppenheimer) may be given freely. For children who have a tendency to rickets phosphatic nourishment is required. Lime water should be given in the milk from an early age. The "Frame Food" products, made nourishing with the phosphates extracted from the cortical layers of wheat, may be given with advantage, and there should be a fair amount of vegetable food given.

A largely vegetable diet tends to favour calcareous deposit, and introduce into the blood a larger proportion of mineral substances than animal food does, so that it goes to feed the bones; and a too exclusively vegetable diet has been said to lead to calcareous degeneration of the arteries. It is asserted that this takes place among the inhabitants of Bombay and Calcutta, where the food consists almost exclusively of rice, and, according to Dr. Raymond, amongst the monks of a convent where pulse was generally eaten.

Wherever there is a tendency to scurvy, fresh vegetable food is necessary, and the potato and lemon are especially serviceable. Scurvy is sometimes induced in young infants by the continued use of inferior brands of condensed milk; and where the child is over eight or ten months old, a little potato may be given to it with advantage under these circumstances; and raw-beef juice should be given thrice daily.

Diet for Obesity should, as I have said above, consist generally of meat and fish. All sugars, sweets, pastry, and all starchy foods, which in the system are converted into sugar, should be avoided. Saccharine may be used to sweeten food. Green vegetables and salads may be taken freely, and there is no objection to any kind of fruit except the banana, which consists largely of starch. Gluten bread may be substituted for ordinary bread. In cases of corpulency there should not be more than three meals a day, and it is best to avoid drinking with meals if possible. Beer and stout are not fit for fat people, and the English and

Germans, who drink much beer, are very much more inclined to obesity than other nations. Ale, stout, and other fermented liquors contain sugar and starch. Rhine wines, clarets, Burgundies, and dry sherry may be taken, but sweet wines such as Port, Madeira, and Tokay are to be avoided. Champagne free from liqueur, and superior white Burgundy (Chablis) called Meursault Montrachet, are safe, but not being regularly kept by wine merchants, I may note that they can be obtained from G. Roussillon fils, Salisbury Square, Fleet Street, E.C., who makes a speciality of his importations. It is necessary to be careful in purchasing wine, as, for example, very poor stuff is often sold as "Chablis." Moselle, which is sometimes recommended, is in its natural state a poor and acid wine, and is constantly "fortified" by shippers, which makes it dangerous. Tea is not a food, and may be taken at 5 P.M. and before rising in the morning, if made weak. The water should always be freshly boiled, and five teaspoonfuls of mixed tea should be allowed to each quart of boiling water. Where concentrated foods such as I have indicated, which consist largely of nitrogenous elements, are taken to reduce fat, the work of elimination is chiefly done by the kidneys, and a considerable quantity of water must be taken in order to wash them out and prevent disease. It is best to take this water hot, and to take it between meals. Stout people should not drink cold water, as they may be induced to take too much.

Gout is very often associated with corpulence, and when it is so, it is necessary that the sufferer should take even more fluid than in other cases. Potash water may be taken freely, as it absorbs the uric acid and carries it off. Mixed with either of the above-named wines it makes a wholesome and pleasant beverage. Vichy water is also very useful, and, as it is imported, may be taken at home just as well as abroad. It may be taken before breakfast, and a little with lunch or dinner. It is most useful as a remedy for acidity in young children.

Uric acid requires no less than 200,000 times its weight of water to dissolve it, and either soda or potash waters may be used for the purpose, but not such aerated waters as contain sugar, namely, lemonade, ginger-beer, etc. Stout people benefit greatly by taking the potash in the form of Bishop's Effervescent Citrate of Potash, a teaspoonful of which may be taken in water between meals. This quenches the thirst at once, and is a pleasing, cooling draught.

The digestion of one who eats much meat is taxed with a much less quantity of solid food than that of a general eater, but the concentration of quality entails an expenditure of force in digestion which in some cases is apt to give rise to nerve troubles.

The Salisbury treatment of corpulence by making the diet almost exclusively of underdone beef-steak and hot water, which has been largely adopted, is found to produce certain nervous conditions which render it inadvisable in many cases, and a fair amount of vegetable food is therefore desirable.

It has been said that a largely animal dietary favours the development of cancer, as well as that of gout, but, if so, it is by introducing waste matters into the blood, through the inefficiency of the kidneys to cope with the work thrown upon them, and the tendency may be combated by taking quantities of hot water as described.

The causes of fatness being known as an inherited tendency, over-eating and bodily inactivity, some idea can be easily gained of the modes of counteracting them. Dieting plays a principal part in systems of fat reduction. Professor Banting used to recommend as the daily diet six ounces of albuminous food or lean meat, one-third of an ounce of fat, and nearly three ounces of starchy food, such as potatoes. His method was principally one of starvation, and I have known the health of many a patient injured by it. Banting, however, was not aware that albuminous food can be, and is, converted

into fat in the body. Ebstein realised this fact, and cut down the allowance of meat to half Banting's quantity, viz. about three ounces. On the other hand, he permitted the consumption of fat, believing that fat taken in food actually prevents the accumulation of fat in the body, by satisfying the appetite easily and by diminishing thirst. The Oertel Schweninger system, practised in the treatment of Prince Bismarck, is a much nearer approach to Banting's, only that it adopts a middle course between his and Ebstein's as regards the amount of fatty food that may be taken, and allows about an ounce of it daily. But Oertel's plan for becoming thin involves attention to other matters than dieting. He expressly recommends exercise and climbing heights, even for those whose hearts are affected and whose breathing is difficult. In the second place, he restricts drinking and regulates diet. Breakfast should consist, according to him, of one cup of tea and three ounces of bread; the midday meal of three ounces of soup, a little fish, eight ounces of meat, salad, one ounce of bread, three ounces of fruit, and either no fluid or else six ounces of light wine in place of the fruit; the afternoon meal of a cup of tea or coffee, and perhaps an ounce of bread; and the evening one of an egg or two, one ounce of bread, a piece of cheese, salad, fruit, and six to eight ounces of wine. To carry out Oertel's system one would also need to resort to a mountainous district like Davos, to stay there a month or more, to make slow ascents of mountain paths, to walk in a particular way, and perhaps to repeat the process several times in a year. This is the German cure, which Dr. Burney Yeo admits may sometimes be useful, but which is only adapted to the rich, the leisured, and the patient. The system pursued in England, and best suited to English taste and habits, is that of Dr. Yorke-Davies; this consists in abstaining from fat-forming ingredients in the dietary, and increasing the flesh-forming to a large extent. The amount of food given is plentiful, but adapted to each

particular case. In his system there is no starving as there was in Banting's. Under this process there is a rapid loss of fat, but at the same time a great improvement in health and condition. Farinaceous food being avoided, gluten biscuits of different kinds are substituted for this purpose from receipts furnished by Dr. Yorke-Davies; these are prepared by Mr. E. Blatchley of the well-known Diabetic Food Depôt, 167 Oxford Street, London.

Food for Fever Patients.—In all febrile diseases the tissue waste is great, and the demand for food is increased by it; but the digestion is impaired. Elimination is interfered with, and the nature of the food given must therefore be carefully studied. The old maxim of "Starve a fever" can now be no longer adopted. It must be the quality of the food that is altered, and not the quantity of its nutritious elements. In all febrile states, and especially in typhoid, the uncooked white of egg, which is pure albumen, is a most valuable food, as it requires little or no digestion, and will not decompose in the stomach. Some authorities maintain that typhoid cases at their worst may, with advantage, be fed entirely upon very weak tea and white of egg, milk being indigestible to them, as tending to ferment in the stomach, and also to coagulate into a solid form in the alimentary canal. Patients suffering from an acute disease who are carelessly fed entirely upon milk are often found to pass masses of curd from the bowel.

In all cases of fever food should be given in a fluid form, in small quantities and at short intervals. Milk must be used with caution, and should be given diluted either with warm water, lime water, soda water, or Vichy water, as, thus mixed, it can be digested in many cases where it would not be digested if given pure. Two ounces of milk and two of alkaline water given at each meal will enable the patient to take two and a half pints of milk in the twenty-four hours. When milk disagrees, whey may be given, and strong meat juice may be added to it. The yolk of an egg may be given

whipped up with a little hot water, but in many cases where the yolk of an egg cannot be digested, the white may be given. If any sugar is used, sugar of milk instead of cane sugar should be given.

In cases of extreme weakness the British Pharmacopœia brandy mixture may be used with advantage, or the amount of brandy may be reduced to a half. Stir together the yolks of two eggs and half an ounce of refined sugar, add four ounces of cognac and four ounces of cinnamon water.

Raw-beef juice is often of service after the crisis of fever has passed, and various infusions of meat, such as beef-tea, meat extract, mutton and chicken broth, and clear soups flavoured with vegetable juices, may then be given. Well-made jellies and calves'-foot jellies, although they are not very nutritious, may sometimes be given as a change to the patient, who generally finds them appetising, and port wine may be given in jelly. Farinaceous food may sometimes be administered with advantage. Thin oatmeal or barley gruel, flavoured with salt or milk sugar, is one of the best foods, and may be made with milk; or arrowroot, ground rice, or well-baked flour may be added to soup or beef-tea. Barley water may be given freely as a beverage, it stimulates the action of the kidneys, and is also slightly nutritious, since it contains a small amount of carbohydrates. Rice water is slightly nutritious in the same way, and may be given if there is a tendency to diarrhœa, as it is rather constipating. Schweitzer's cocoatina, made with milk, agrees with most sick people, and tea and coffee sweetened with milk sugar are generally allowable, except in severe cases.

Milk peptonised with Fairchild's Peptonising Powders may be given in many cases where milk would not otherwise be digested. In all febrile cases alcoholic stimulants should be used *as medicine*, and prescribed only when necessary. They are best given in the form of brandy or whisky diluted with water, and in some cases, such as influenza, in the form of champagne. Bishop's Effervescent Citrate of

Magnesia serves as a pleasant, cooling draught and mild aperient in feverish states.

During convalescence from fevers, and especially in typhoid, it is necessary to be very careful, as the digestive powers are still limited, and even a very small indulgence in solid food, such as a small piece of bread and butter smuggled in by a friend and given to a typhoid patient without the nurse's knowledge, has been known to cause death through the breaking down of one of the ulcers in the bowels. After the crisis is past, for a week or two a fluid diet should be kept up, a little bread crumb may be added to soups or beef-tea, and farinaceous foods may be given in small quantities, such as ground-rice pudding or tapioca pudding. Pounded raw meat also is then of great value. The advance to a little boiled fish and chicken must be made very cautiously. The patient's friends should rely upon the medical man's instructions on the subject, and the doctor must be guided entirely by the state of each individual case, and not attempt to stick to hard-and-fast rules.

Diseases of Mal-nutrition.—Anæmia, or poorness of blood, the commonest disease of civilisation, is more frequent in women than men, and is generally due to want of sufficient air, exercise, and food. Young women are apt to become faddy about their food, and to prefer living on innutritious articles of diet, such as sweets, pastry, cakes, bread and butter and tea, etc., instead of more solid and nutritious food. It is necessary in such cases that the diet should be carefully overhauled. A cup of milk, with a tablespoonful of rum in it, or an egg beaten up in milk, may be taken before rising in the morning. For breakfast, oatmeal porridge with cream should be followed by fish or an egg, and the drink should be either cocoa or coffee made with milk. Meat should be taken at both lunch and dinner, and instead of five o'clock tea, a cup of cocoatina and milk, with whole-meal bread and butter, is a good thing. An efficient blood-making wine, to be taken with lunch and dinner, is desirable. The best wine for anæmic

patients is decidedly Burgundy which has lost its sugar by fermentation, and is free from the addition of alcohol by which many wines are "strengthened." I have recently become acquainted with a very strong and blood-making wine prepared by the firm of G. Roussillon fils, of Salisbury Square, Fleet Street. It is called "Frozen Burgundy," as by means of freezing and removing the watery part, the body and flavour are concentrated, and the wine rendered far more strengthening than any ordinary Burgundy. It may be taken with warm water at meals or before going to bed, and is agreeable as well as beneficial. The "Frame Food Diet," which is of special value in restoring the blood, is useful, and in all anæmic persons iron is to be regarded more as a food than as a medicine. Iron given in a liquid form is apt to injure the colour of the teeth and cause headache. When given in ordinary pills it becomes rapidly oxidised and indigestible, and a very useful new plan of giving iron has recently been adopted, by which it is put up in gelatine, which dissolves rapidly in the stomach, but is perfectly air-tight. This form of preparation is called the Palatinoid, and is patented by Messrs. Oppenheimer, Son, and Company, of 14 Worship Street, London, E.C. Those who fail to take pills are able to take these palatinoids, which become slippery when put into the mouth and are swallowed without difficulty. One palatinoid of iron carbonate is equal to a four-grain Blaud's pill, and may be taken three times daily after meals in cases of anæmia, while, if there is constipation, a quarter of a grain of powdered Barbadoes aloes or the same quantity of cascara sagrada can be had in each palatinoid. Parish's Food Palatinoids, each one of which is equal to a teaspoonful of the food, may also be had, and are useful for children's diseases where iron is required.

Spinal irritation or neurasthenia is, according to Hammond, due to anæmia of the posterior elements of the spinal cord; and in this complaint the diet must be even more nutritious than in ordinary cases of anæmia. Where there is difficulty

in digesting large and solid meals, there should be suitable feeding every two hours, raw-beef juice, cod-liver oil, and milk being most useful. At 11.30 A.M. a cupful of strong beef-tea may be given, and also the last thing at night, in addition to the dietary above recommended for anæmia.

In cases of *hysteria*, where food is obstinately refused, injections of strong soup or other enemata should be given. The hysteric girl finds this process so unpleasant that she will soon take her meals quietly when threatened with being forced to take them by injections, unless she will do so in the ordinary way.

Gastric catarrh and diseases of the stomach, accompanied by much pain and irritation after food, are specially apt to occur in persons who are anæmic or feeble after acute diseases, or when the stomach has been overloaded even in healthy persons. In these cases the important point is to rest the stomach as much as possible, and to allow the inflamed mucous membrane time to rest. As long as the taking of solid food excites a feeling of sickness, vomiting, or pain, only liquid food should be given. One-third lime water to two-thirds of milk, milk beaten up with white of egg, whey, raw-beef juice, and beef essence without the fibrin of the meat, are the most suitable foods, and twenty grains of subnitrate of bismuth in a wineglassful of milk every twenty-four hours helps the stomach by serving as a mechanical protection. Barley water may be given as a slight aperient when there is constipation, and a cascara palatinoid may be given at bedtime. When there is diarrhœa, it is a good plan to thicken the food with arrowroot. Rest in bed should be enjoined when the food has to be entirely liquid. In most cases, after about four days, more solid diet, with meat, broths thickened with sago and tapioca, white boiled fish, and afterwards boiled chicken or pheasant, or a boiled chop, may be taken. In *chronic gastric catarrh* buttermilk is very useful.

In *ulcer of the stomach* the diet indicated for acute gastric catarrh is also of service.

In the feeding of cases of *cancer* of the digestive organs, very much depends upon the individual as to what can be taken. The liquid dietary as given above is usually the best, but in some cases a small amount of solid animal food can be taken and digested. Where there is cancer of the pylorus it is most necessary to avoid starchy foods unless they are predigested, for these cannot be digested in the stomach, and there is difficulty in their passing out of it, so they irritate, often giving rise to acid fermentation and setting up pain. The great point in cancer of any part of the stomach is to give the greatest amount of nourishment in the smallest bulk. If there is any bleeding the strength should be supported by injecting foods. One of the most useful of nutrient enemata is the following:—

Beef-tea	2 ounces.
Brandy	½ an ounce.
The yolk of an egg.	
Raw arrowroot	1 teaspoonful.

Raw arrowroot assists its retention. Port wine and egg may also be injected in the same way.

In cases of *persistent diarrhœa* and debility, "koumis" or fermented mare's milk is a most valuable food, and is very serviceable in cases of persistent vomiting, and the vomiting of pregnancy. I have known a severe case of chronic diarrhœa, in which many other forms of treatment failed, entirely cured by the use of "koumis," which both nourishes and stimulates.

In cases of *dilatation of the stomach* food should be given in the smallest possible bulk, and liquid should be limited, no more than six or eight ounces being taken with the food. If the patient is very thirsty, a teacupful of hot water may be sipped slowly half an hour before each meal. As food should be concentrated, it ought to be chiefly animal, and the lean of meat, with the fibrin and tendons removed as far as possible, is the best. Starches and carbohydrates should only be taken

in small quantities, as they are liable to set up fermentation, and the quantity of vegetables must be limited. White fish, cheese, and eggs, may be given. Only very stale bread or dry toast should be eaten, and a long interval should be allowed between meals.

In ordinary cases of *dyspepsia* it is generally sufficient to go over the dietary carefully in the light of what has been said about the digestion, and correct any bad habits. Want of exercise, or too much labour either of body or mind, mental anxiety and great weakness, are all chief causes of dyspepsia; and excessive indulgence in tea, coffee, alcohol, or tobacco, with the taking of excessive quantities of condiments, are also causes. In chronic cases there is generally loss of appetite, weight and fulness in the chest, constipation sometimes alternating with diarrhœa, and there is acidity, coated tongue, and offensive breath.

In all these cases the great point is to eat what food is easily assimilated, and to avoid overloading the stomach. Three meals a day should be taken, with meat at two of them. Beef, mutton, and game (except hares and rabbits) may be taken, but pork and veal should be avoided. Chicken, sweetbread, and tripe are easily digested, but all kinds of meat which have been hardened by cooking or by the use of condiments should be avoided. Eggs may be taken if they agree. Fish may be eaten in moderation, but only white fish. Oysters are easily digested by some, but should not be taken with alcohol, such as brandy or whisky, which tends to harden them. Vegetables must be taken with caution, and if they cause flatulence, rice, macaroni, or some kinds of fruit, such as grapes or stewed prunes, may be substituted. Potatoes, if taken, must be well boiled, baked in the skins, or mashed. Spinach, vegetable marrow, beetroot, and young peas may be taken, but turnips, carrots, and Jerusalem artichokes are likely to disagree. Raw vegetables, such as cucumbers and salads, and new bread, must not be eaten, and pastry, fried dishes, shellfish, nuts, pickles, and cheese are forbidden.

Sugar, sweets, jam, marmalade, and condiments are rarely advisable. Condiments are merely stimulating drugs, which do their work by exciting the inner lining of the stomach, often leading to irritation and inflammation.

A dyspeptic may sometimes obtain immediate relief by taking cayenne pepper, and if this is used only as a temporary relief for an exceptional attack of indigestion it is permissible; but if taken habitually either in pills, or over the food, or in made dishes, it acts as a slow poison, and has a most destructive effect on the stomach.

Generally, the victim of indigestion caused by condiments begins by taking them to force the stomach to do more than its natural work, and uses only a little at first. Then the stomach becomes accustomed to this and demands more, and the sufferer goes on increasing the quantity until inflammation, with perhaps ulceration and permanent injury to the digestive powers, takes place. Sufferers from indigestion find great relief from taking PEPSALIA with their meals. This is a preparation composed of table salt of the purest kind, with which pepsine and other digestive principles natural to the stomach are not merely mixed but combined by chemical process. It thus supplements the deficient digestive juices of the stomach, and acts upon the food so as to partially digest it. PEPSALIA may be used at table in just the same way as ordinary salt, and has nothing to distinguish it either in appearance, taste, or odour from table salt. This is a considerable advantage, as many people object to taking anything that has the appearance of medicine at meal-times when they may be observed by other people, and this objection has been very much against the use of pepsine in its ordinary form. PEPSALIA is not in any way unpleasant to take, and its results are excellent.

If a sufferer from indigestion can manage to do without wine, beer, or spirits, it is best to be, as far as possible, an abstainer, but if wine really seems to be necessary it is best to alternate different kinds if they agree, limiting the quantity.

Spirits are forbidden, except in severe cases of exhaustion and diarrhœa, when a little brandy may be taken well diluted with soda water. Beer should be avoided as likely to cause flatulence, and coffee should not be taken after meals.

The following is a fair dietary for an ordinary case of dyspepsia :—

Before rising take a glass of hot water or of milk and lime water. Take a cold or tepid bath, with sea salt or Scrubb's ammonia ; rub briskly with a rough towel, and do exercises with clubs or dumb-bells. If possible, take a few minutes walk in the open air before breakfast.

Breakfast, 8.30 A.M.—Weak tea or coffee, with plenty of milk, or cocoatina, sole or whiting, or the lean of an underdone mutton chop ; or one or two new-laid eggs, with stale bread or toast ; watercress occasionally if it does not cause flatulence.

Luncheon, 1 P.M.—Oysters, soles, roast mutton, chicken, or an underdone chop, biscuit or stale bread. If there is no appetite, a raw egg beaten up with a little dry sherry and milk, and taken with a biscuit, may be substituted.

Dinner, 6 P.M.—A selection of the following : *Fish*—soles, whiting, smelts, turbot, brill, or cod. *Meat*—Mutton, venison, chicken, grouse, partridge, pheasant, tripe, sweetbread, boiled mutton, or underdone beef. *Vegetables*—Cauliflower, asparagus, French beans, vegetable marrow, sea-kale, and floury potatoes. *Fruits*—Grapes, oranges, baked apples, stewed prunes. A tablespoonful of old brandy with soda water, or a glassful of dry sherry or claret if required.

This dietary, or something approaching to it, may be adopted after recovery from the acute symptoms, during which a more restricted dietary, as detailed above, with reference to gastric catarrh, is very often necessary. In all cases of indigestion it is very important that the condition of the teeth should be carefully overhauled.

Constipation.—A too exclusively nitrogenous diet is apt to cause constipation, and I have referred to some of the causes of this trouble before. Draughts of cold water at bedtime

and before rising, or very hot water, often keep the bowels in order, while an orange, a plate of stewed prunes, or figs soaked in oil, are very useful remedies when taken before breakfast. Brown or whole-meal bread should be taken; ordinary white bread, eggs, milk or farinaceous foods, tend to increase constipation, but oatmeal and maize lessen it. Linseed is very useful in this trouble. A teacupful of water may be poured on a tablespoonful of linseed, and after allowing it to stand for an hour the whole is to be drunk before a meal. Plain boiled onions are also useful.

Diarrhœa.—Fish, meat, fruit and vegetables in which decomposition has already commenced, are common but too often overlooked sources of temporary attacks of diarrhœa.

It is advisable to avoid all fruit, green vegetables, beer, stout, acid wines, tea and coffee, and drink a little weak brandy and gingerbeer, or brandy and soda water, instead of any other wine or spirit. Taken two or three times a day, a dessertspoonful of the following mixture does much good :—

Powdered White Sugar .	1 dessertspoonful.
Cinnamon	1 dessertspoonful.
Raw Arrowroot . . .	1 tablespoonful.

Brandy and water sufficient to make a paste.

In *chronic diarrhœa* green vegetables, raw fruits, nuts, potatoes, irritant articles such as coarse brown bread, oatmeal, and rough biscuits, with all fat or acid dishes, and hard or indigestible articles of food, should be avoided Boiled milk mixed with arrowroot, rice, sago, and tapioca are useful, and a severe attack may sometimes be cured by dieting entirely upon arrowroot and water, flavoured with cinnamon, and with the addition of a little brandy.

Chronic diarrhœa in an adult is decidedly difficult to treat, and if possible search should carefully be made for some cause, such as impure drinking-water, the use of copper vessels in cooking, arsenic in the wall-paper or carpets, contamination of the air by sewer-gas through bad drainage, or any bad

smell. Internal parasites will sometimes cause diarrhœa. When the stomach is very irritable, it is a good plan to take a tablespoonful of cream beaten up with the white of a new-laid egg, and add a teaspoonful of brandy to the mixture, having previously dissolved a lump of sugar in the brandy. Sometimes the adoption of an entirely milk diet will effect a cure. Lime water mixed with milk, in the proportion of one quarter of lime water to three of milk, is an excellent remedy. One drachm of subnitrate of bismuth may be taken in milk every four hours. This is a larger dose than is generally given, but it is found not to disturb the stomach, nor cause any inconvenience. Injections of two grains of iodoform in an ounce of starch gruel are of very great service.

After improvement ordinary diet should be returned to with great care, taking at first only beef-tea, mutton broth, or a raw egg beaten up with milk and flavoured with a teaspoonful of brandy. The following is an agreeable variety of milk food :—Boil a pint of new milk, with sufficient cinnamon and white sugar to flavour it pleasantly ; this may be taken cold, with a teaspoonful of brandy.

Diet in Diabetes.—All articles of diet containing sugar and starch should be avoided by such patients ; saccharine may be taken instead of sugar. A very convenient form of saccharine is the tabloid, each tabloid being equal to half a grain of saccharine. These tiny discs are equal to several lumps of sugar as a sweetening agent, and are now exceedingly popular with all patients to whom sugar is injurious. The only kinds of animal food which must be forbidden are honey and liver, which contain sugar. Potatoes, carrots, parsnips, beetroots, turnips, radishes, and as a general rule all such white vegetables as contain sugar,—for example, cauliflower, brocoli, sea-kale, asparagus, and celery,—should not be taken, but any vegetable which has become green has lost its sugar, and may be used freely. Greens, spinach, watercress, and lettuce may be taken. Sago, tapioca, vermicelli, macaroni, and other preparations of wheat must be quite given up. The cutting

off of the bread is the greatest deprivation, gluten bread not being very nice to eat. It is prepared by washing out the starch from wheat and flour, and then using the gluten which remains. Dry toasted bread is not so objectionable. Rusks and biscuits have lately been prepared with sweet almond flour deprived of its starch by pouring over the almonds boiling water slightly acidified with tartaric acid. Bran cake can be made at home. The husks or bran of wheat is devoid of sugar, and can consequently be used with perfect safety. It can be made as follows :—Take a quart of wheat bran, boil it for a quarter of an hour in water, and then strain through a sieve, next repeat the process, after which wash it well with cold water on the sieve till the water running through it is quite clear. Then squeeze the bran as dry as possible in a cloth, place it on a dish in a slow oven, which can be done at night, and allow it to remain till the morning, when if dry and crisp it will be ready for grinding. Grind it in a fine mill, and sift it through a fine wire sieve, pressing it through with a brush. What remains in the sieve must be ground again till it becomes quite soft and fine. Take of this powder three or four ounces, from three to seven fresh eggs, one or two ounces of butter, and about half a pint of milk. Beat the eggs with a little of the milk, and warm the butter with the rest of the milk. Stir all together, and add a little nutmeg or other spice according to taste. Bake in buttered patty pans in a rather quick oven for about half an hour. These cakes, when baked, should be rather thicker than captain's biscuits, and may be eaten with plenty of butter. All kinds of preparations of gluten, bran, almonds, cocoa-nut, glycerine, etc., for the use of diabetics, may be had from Mr. E. Blatchley, 167 Oxford Street, London, W., who supplies most of the hospitals, and from whom the bran flour and gluten flour may also be obtained for use in home cookery.

The following three recipes are pleasant in change when the patient tires of custard and custard puddings :—*Apple*

Snow.—Reduce half a dozen apples to a pulp, press them through a sieve, sweeten with a few tabloids of saccharine, and flavour them. Take the whites of six eggs, whisk them some minutes with a little saccharine, beat the pulp to a froth, then mix the two together, and whisk them until they look like stiff snow. Pile high in rough pieces on a glass dish. *Lemon Cream.*—Pare into a pint of water the peel of three large lemons; let it stand four or five hours; then take it out, and put to the water the juice of four lemons and four grains of saccharine, or eight tabloids dissolved in a little boiling water. Beat the whites of six eggs, and mix it all together; strain it through a fine sieve, set it over a slow fire, stir it one way until as thick as good cream; then take it off the fire, stir it until cold, and put into a glass dish. *Orange Cream* may be made in the same way, adding the yolks of three eggs. *Snow Pudding.*—Put into half a pint of cold water half a packet of gelatine. Let it stand one hour; then add one pint of boiling water, eight grains of saccharine, and the juice of two lemons. Stir and strain, and let it stand all night; beat very stiff the whites of two eggs, and beat well into the mixture.

Diabetic patients should avoid sweet wines, sweet ale, porter, and stout; but may drink dry sherry, bitter ale, and now and then brandy and whisky. They may drink tea, coffee, and cocoa made from the nibs, provided no sugar is taken with them—saccharine, a tabloid for each usual cube or knob of sugar, may be used instead. Aerated waters may be taken, but not gingerbeer or lemonade, as sugar is used in these. Blancmange, custards, and milk puddings may be sweetened with saccharine. One form of treatment which is said to be of service is called the "skim milk treatment," nothing of any kind being taken except skim milk for from four to six weeks; two or three quarts of skimmed milk or more can be taken during the twenty-four hours, and nothing else whatever.

The scientific adaptation of diet to varying conditions of

health and disease has, until quite recently, been woefully neglected, and the subject of food and of digestion is of such great importance that I have hardly been able to treat it as fully here as I could wish; but for fuller information and details I cannot do better than refer my readers to an excellent book on *Indigestion*, written by Thomas Dutton, M.D., and published by H. Kimpton, 82 High Holborn, W.C. This book, while thoroughly scientific, is written in a sufficiently popular form to be useful to all who suffer from indigestion or wish to avoid it.

CHAPTER IX

THE EXCRETORY ORGANS

I HAVE shown in a previous chapter, when dealing with the circulation of the blood and the lungs, how the blood is supplied with nutritive matters, how it is purified, and how it is distributed over the body.[1] When it has traversed the various ramifications of the arteries it enters the capillaries, so called because they are tiny blood-vessels, no thicker than a hair, with fine and easily permeable walls. Here the products of the waste of the tissues pour into the blood, and, as even in the blood, the corpuscles, of which it is full, decay and die, the results of their decomposition accumulate in it. Therefore, as waste matters are constantly poured into and generated in the blood, it is necessary that in order to keep the blood pure these should be got rid of.

Three sets of organs are employed in this office, and they work in similar ways, although their functions to a great extent differ. These organs are the lungs, the kidneys, and the skin. Water is the chief constituent in the excretions of all three, but most water and solid matters are given off by the kidneys, and most gaseous matters by the lungs. The skin partakes of the nature of both, since it takes in oxygen from the air and breathes out carbonic acid gas and water; while it excretes organic and saline matters dissolved in water in the same way as the kidneys do. The lungs, the kidneys, and the

[1] See Chap. III. pp. 21-24.

skin may therefore be considered as the drains from the blood, by means of which it is always losing substances. But besides this, as the blood passes from the capillaries it is always losing water with matters suspended in it, which exudes into the surrounding tissues, and it also loses in another way, in the form of heat, which is constantly being given off from the body.

The blood which enters the liver loses material in its passage through that organ ; but this loss is made up by the sugar and bile which re-enter the circulation either in the liver or elsewhere.

The Lungs.—I have shown how carbonic acid, water, and some organic waste matters are lost by the lungs, while oxygen is gained through them ; the nitrogen which enters the lungs in atmospheric air being unchanged in them, and only serving to dilute the oxygen.

The Kidneys are placed on either side of the lumbar region of the spine at the back of the cavity of the abdomen. Their shape is familiar, as it is similar to that of the kidney of a sheep. The concave side of the kidney is turned inwards, or towards the spine, and from the middle of it a long tube called the ureter passes to the bladder, which is an oval bag, the walls of which contain unstriped (involuntary) muscular fibre, lined by a mucous membrane. The ureters open side by side at some little distance from each other, and enter the walls of the bladder obliquely, it being much more easy for fluid to pass through them into the bladder than to get back again. At the neck of the bladder there is a sphincter containing muscular fibres arranged circularly, which close its exit, and are only relaxed voluntarily when requisite while the parts are in perfect health. Normally the walls of the bladder are relaxed and the sphincter contracted, but at intervals the walls of the bladder contract and the sphincter relaxes, so that its contents are expelled. This takes place when the accumulation of fluid leads to uneasy sensations. The fluid collects by constant dripping from the openings of the ureter into the bladder. The excretion is naturally

slightly acid, and consists chiefly of urea and some uric acid, with other animal products, and saline and gaseous substances held in solution by much water. The composition and quantity of urine vary according to the time of day, the temperature and moisture of the air, the nature of the food, and the condition of the individual as regards meal times. Both urea and uric acid are composed of hydrogen, oxygen, and nitrogen; but urea is more soluble in water than uric acid and greatly exceeds it in quantity. Thus a man in average health loses about 50 ounces of water by the kidneys in 24 hours, and in this are dissolved 500 grains of urea, but only from 10 to 12 grains of uric acid. In the gouty condition the quantity of uric acid is greatly increased; in hysterical conditions the quantity of water is greatly increased and the urine becomes paler. The quantity of water lost in *diabetes insipidus* is also very much increased, this probably being due to chronic nervous conditions somewhat similar to those which are intermittent in hysteria. In *diabetes mellitus* sugar is found in the urine, and in Bright's disease albumen is found in it; while in other conditions blood is sometimes found in it.

The amount given off of other animal matters and saline substances varies from about one-third to nearly the same as the urea. The saline matters are chiefly common salt, phosphates, and sulphates of potash, soda, lime, and magnesia. The gases are the same as those in the blood, but less than one-third as much. The carbonic acid is large in proportion to the amount of the oxygen. The specific gravity of the urine does not ordinarily differ much from that of the *serum* or watery part of the blood, being 1·020. The kidney is, in point of fact, roughly speaking the filter which separates certain matters from the blood. In its cavity the tiny capsules resemble those found in the liver, and the waste matters from the capillaries pass through into the tubules of the kidney in a similar way to what they do in the air cells of the lungs.

Irritation of the nerves which supply the vessels of the

kidney stops the excretion of urine, and the consequent purification of the blood by the kidneys.

When speaking of the diet for various diseases, I have emphasised the necessity of keeping the kidneys well flushed; and it must be remembered that in hot weather, when much moisture is lost by the skin, the amount of water lost by the kidneys is very much decreased, and the contents of the bladder are apt to become highly concentrated and irritating. Under these circumstances the use of alkaline waters, especially of Bishop's Effervescent Citrate of Potash, and of hot water as a drink, as well as of barley water, which stimulates loss by the kidneys, is indicated. In cold weather, when less work is done by the skin, the kidneys are brought into more active service.

The Skin is a complete covering to every part of the body, and it serves as a protection to the parts it covers. Being to a certain extent non-conducting, it also partially prevents the body from losing too much of the heat which is manufactured in it, and in this duty it is supplemented in the lower animals by fur or feathers, in man by clothes. The skin is soft, flexible, and elastic, adapted to the surface of the body and to its movements. It is composed of two layers. *The outer, scarf skin, cuticle,* or *epidermis* varies much in thickness at different parts of the body, being thickest where there is most pressure, as on the palms of the hands and soles of the feet, where it is dead material, containing neither nerve fibres nor blood-vessels, and is in the form of layers of fine flat scales laid like the tiles on a roof, which are constantly being thrown off as scurf, and constantly being formed in the deeper parts, which are contiguous to the true skin, or *dermis.* The *true skin* is highly sensitive, being supplied with countless nerve fibres and endings, and its sensibility varies in parts owing to differences in the number of these. It is mainly composed of bundles of tough fibres, connected in all directions, and contains besides nerves the sweat glands, which open on the surface in pores, and innumerable tiny blood-vessels called

capillaries. I have shown that by the process of osmosis,[1] when a permeable membrane has on one side of it a liquid, and on the other side the air, an exchange goes on between the two, owing to the law of diffusion of gases, which causes light and heavy gases to exchange places.

The skin is itself a permeable membrane, so perspiration or "breathing through" would go on through its structure even were there no glands devoted to the purpose of excreting perspiration. But all over the surface of the body there are tiny holes which can easily be seen with the naked eye, and are the openings of the sweat glands passing out through the skin. They are very small tubes, not more than $\frac{1}{300}$ of an inch in diameter and a quarter of an inch long, which are twisted up with the capillaries into a kind of knot, the arrangement being similar to that of the capillaries in the lungs,—only the very thin walls of the capillaries and of the sweat glands interposing between the blood and the inside of the gland.

As a rule the surface of the skin does not appear moist to the eye, but moisture is always being given off in the form of what is called "insensible" perspiration. When the temperature is high, or under physical activity, or mental emotion, beads of water appear irregularly on the skin, and this is called "sensible" perspiration. The amount of perspiration varies very much according to conditions of the blood and nervous system, and to the states of the air; but as a rule nearly twice as much water is given off through the skin in the same time as from the lungs, but not more than one-third or one-fourth part as much carbonic acid gas is given off as from the lungs. The skin, however, gets rid of about $1\frac{1}{2}$ per cent of solid saline matters, lactic acid, urea, and other waste products.

Normally, sweat is acid, and contains certain fatty matter; but when it reaches the skin it is mixed with the fatty secretion of the *sebaceous* or oil glands which lie one on each side

[1] See p. 27.

of every hair follicle. The sebaceous glands are naturally more active on the skin of the head, where the supply of hair is greater, and on other hairy parts of the body, than on parts of the body which are not hairy, although all over the body very fine hairs are found, except upon the soles of the feet and the palms of the hands. The outer layer of the skin is thickest where there is most pressure, namely, on the palms of the hands and the soles of the feet; and dead material and scales are constantly being given off from its surface, which mix with the perspiration and sebaceous deposit, and form a greasy and dirty layer upon the skin, part of which is taken up by the clothes, and which needs to be constantly removed by means of washing, and changing the clothes, if the skin is to be kept in healthy action.

When speaking of the bath I shall show how necessary it is to keep the skin acting freely, and it is important not to hinder its action by the use of insoluble powders, paints, or improper clothing, as is often done. In skin diseases, if at all general, it is more than ever necessary to keep the kidneys acting freely, and also to attend to the action of the bowels, to which I have referred in a previous chapter. The bowels act to a certain extent as excretory organs; but their action does not so much refer to the blood as to carrying off the waste matters of digestion.

The sensations of heat and cold are felt, and loss of heat goes on, by means of the skin.

That every object must possess a certain degree of heat is evident if we regard heat as a mode of motion among particles, for everything in nature is composed of groups of particles. Tyndall, in his great work on *Heat as a Mode of Motion*, explained this difficult question very clearly. "It seems possible," he says, "to account for all the phenomena of heat, if it be supposed that in solids the particles are in a constant state of vibratory motion, the particles of the hottest bodies moving in greatest space. . . . Temperature may be conceived to depend upon the velocity of the vibrations; increase of

capacity in the motion being performed in greater space." Thus, friction produces increase of heat by increasing the rapidity of the motion of particles, and every case of combustion "may be ascribed to the collision of atoms which have been urged together by their mutual attractions." The particles of all substances have a tendency to be set in motion by those of substances of a different kind, although "*vibrations never* take place between substances of the same nature." By this means motion is propagated among the particles of neighbouring bodies by what is called *diffusion of heat*, until each body is of the same temperature, as may be shown by testing with the thermometer.[1] Thus, if we touch something, the temperature of which is higher than that of our bodies, an increased motion of our particles is set up, and we say it feels warm; whereas, if we touch something of a lower temperature, our own temperature is lowered by the contact, while that of the other body is raised. The vibration of the particles of bodies may be increased by percussion, friction, and combustion, or other chemical change.

Heat, like light, radiates from all bodies in straight lines, and the temperature of a body on which radiant heat falls is raised by transmitted motion, just as a string vibrates when a sound in unison with it is transmitted to it through the air. When heat passes by direct contact from particle to particle of a body, or from the particles of one body to another, it is said to be communicated by *conduction;* whereas, if a space intervenes, it is said to pass by *radiation.* Thus the sun's heat is radiated on to the earth, the heat of a fire radiated on to objects in a room.

Heat is lost from the human body by conduction, radiation, and also by convection or the rising of heated particles.

The origin of animal heat has been for centuries a debated question, and until of late no thoroughly satisfactory results

[1] In cases where the thermometer is not a sufficiently delicate test a thermoelectric pile is used, by which the heat is converted into electricity, and is then measured as such by means of a galvanometer.

have been obtained; but the theory here explained rests upon facts gained by numerous scientific experiments, and upon inductions therefrom. There is therefore every reason to believe that it is the true one, although animal heat may be in part caused by the friction of the blood in its rapid passage through the arteries and veins, as well as by the chemical action which takes place in it. This theory is borne out by the fact that when the circulation is slow, as in old people and during sleep, the temperature is lowered; whereas in fevers, where the temperature is high, the pulse is always found beating rapidly, and the breathing quickened.

We know that a fire will not burn unless the air can get to it—that is to say, unless oxygen can come to combine with the carbon of the coal. It is the same in the animal body: the carbon which is derived from the food eaten is, as it were, the fuel which sets our machinery in motion; but that it is not wholly expended in work has been proved by experiment and observation. The muscles convert chemical force into mechanical work; but, to quote the words of Dr. Mayer, "the maximum mechanical effect produced by a working mammal hardly amounts to one-fifth of the force derivable from the total quantity of carbon consumed; the remaining four-fifths are devoted to the generation of heat." When a muscle contracts heat is developed in it. This has been found so, even in the muscles of dead frogs, and in the case of persons who die of that terrible disease tetanus. In this a general contraction of the muscles takes place, and death is caused either by starvation through lockjaw, or suffocation, owing to the prolonged contraction of the muscles employed in breathing. The temperature of the muscles is then sometimes found to be nearly 11° Fahr. above the normal. The arterial blood charged with oxygen when passing through an uncontracted muscle is changed into venous blood, which then retains about 7½ per cent of oxygen; but if the muscle is contracted, the arterial blood is almost wholly deprived of its oxygen, the quantity remain-

ing in some cases only amounting to $1\frac{3}{10}$ per cent. When the muscles are in activity, therefore, there is increased combustion—more fuel is burnt up. As a consequence of this an increased amount of carbonic acid is expired from the lungs, and during great exertion the quantity of this gas which is expired may be even five times as much as that breathed out during repose. A furthur consequence of the increased combustion, moreover, is that an increase of food is required, and we all know how hungry vigorous exercise makes us.

CHAPTER X

CLOTHING

The Philosophy of Clothing

THE chief sensations which guide us in our choice of dress are those of heat and cold. The sensations of heat, as a rule, are fairly attended to in our climate, where it is rarely so warm as to need any very special care, and love of appearance is also a safeguard in this respect; for we do not like to look hot and perspiring, and so take care to keep as cool as possible in warm weather. As far as regards cold, however, I believe the sensations are much neglected, and harm results to a very great extent.

Animal heat, as I have said, is chiefly caused by the oxygen which is conveyed to the blood by means of the lungs, combining chemically with the carbon which it finds in the blood, and which has been formed by the digested food,—just in the same way as the oxygen of the air combines with the carbon of the coal in our fireplaces and gives out heat. The temperature of the blood is about 99° Fahr., and a fall or a rise of very few degrees results in death. As the temperature of the body is, except under very rare circumstances, a very great deal higher than that of the surrounding atmosphere, animals are constantly losing heat, and it becomes a matter of vital importance that some non-conducting substance shall be interposed between the warm blood and the cold air. The skin being to a certain extent a non-conductor, partially pre-

vents excessive loss of heat, and in this duty it is supplemented in the lower animals by feathers or fur, and in man by clothes. Animal substances, such as hair, fur, wool, and feathers, are good non-conductors of heat, and the colder the habitat of the creature the thicker the hair or feathers which cover it. These, together with layers of fat, are Nature's protection to the creatures on which they grow, and they save those creatures from being frozen to death in arctic regions or roasted by tropical heat. Thus in the arctic regions the blood of the bear or the seal is kept at about 100° above the temperature of the surrounding air, which may be below zero while the interior of their bodies is about 99° to 104° Fahr.

In imitation of Nature, human travellers in cold climes rob the beasts of their skins in order to increase the protective power of their own less efficient cuticles, and case themselves in fur, as without such a non-conductor to retain the heat of their bodies, it would be conducted away by the cold air quicker than it could be replaced by the action of the oxygen on the carbon obtained from food, and the coldness of death would inevitably follow. Cold is simply the absence of heat, and cold air passing over the body abstracts heat from its surface, and in so doing communicates a certain painful and familiar sensation to the nerves of the skin.

The warmth of clothing, whether for children or adults, should be regulated by the thermometer, not by the season of the year, and, as Combe says, "should be sufficient in the individual case to protect the body effectually from an abiding sensation of cold, however slight." Clothes to be healthy should give the maximum of warmth with the minimum of weight, and these conditions are best supplied by woollen materials. Wool is the natural protector, and besides being a first-rate non-conductor of heat, it possesses another advantage in the fact that it is a good absorber of moisture. The skin, as already observed, excretes a quantity of water; hence it is important that the clothes should be able to absorb water and allow it to evaporate through them. Now, wool permits

this in a high degree, while vegetable fibres, such as cotton or linen, can only absorb a little of the perspiration, and then hang wet about the body, which they allow to remain damp. They thus check the further action of the skin and act injuriously to it, just as clothes wet with rain would do. Wool is from every point of view the natural and most suitable material for clothing, and for my own part, I believe in its value both for summer and winter wear, as the thickness of the materials and quantity of clothes worn can be varied to suit the temperature.

Colour of Clothing

With regard to the colour of clothing, attention should be drawn to the fact that poisonous dyes, and especially arsenic, are frequently used in dyeing and preparing clothing materials. Even articles which are worn next the skin, such as drawers, stockings, socks, and gloves, have been found dyed with arsenical colours, and I have seen two or three cases of arsenical poisoning clearly traceable to the cutting up of art-muslins; one peculiar case of skin disease in the hands, which had resisted treatment for a long time, being traced by me to this cause.

Dr. Myrtle of Harrogate mentions a patient who had for some time been wearing stockings of a deep red colour, and suffered from large inflamed blisters. Treatment was given for several weeks, and the stockings discarded, but the trouble remained. Then he discovered that she was wearing slippers lined with magenta flannel which kept up the irritation. After the removal of the lining she soon recovered.

Apropos of this case, Dr. Myrtle remarks that he has had several cases where mauve-dyed articles of clothing have produced great local irritation, which in one or two cases has proved not only painful, but most difficult to cure. Neckties and socks have furnished obstinate forms of an eruption of an herpetic character, the base of each vesicle being painful and greatly inflamed. The eruption has, in appearance and nature,

resembled shingles more than anything else, although it is, as far as his observation goes, a distinct form of skin disease.

Dr. Blair, of Goole, has mentioned a case in which a lady, after wearing a pair of bronze-green silk gloves for a day or two, was attacked with a peculiar blistering and swelling of both hands, which increased to such an extent that for three weeks she was compelled to carry her hands in a sling, suffering acute pain, and being unable to feed or dress herself.

Beautiful colours, such as red, blue, violet, and yellow, are dyed with derivatives of coal-tar, and when worn in contact with the body will sometimes produce irritation, eruptions on the skin, and even constitutional disturbance. Arsenic is used in linen glaze, and paper collars and cuffs, and, as before observed, is largely used in the preparation of aniline dyes, but if properly managed does not pass into the "finished" dye. Hence the painful and irritating effects produced by articles of dress dyed with aniline colours are generally caused by the dyes themselves when improperly fixed. Aniline is a narcotic poison when taken internally, and a local irritant if applied to the skin, so that the dyes derived from it may participate in its poisonous qualities.

Aniline colours are largely used in artificial-flower making; and some foolish women I have known, who, instead of using rouge, have used artificial red geranium flowers, or an artificial rose, for colouring their cheeks, have had to suffer from their want of sense and knowledge in this respect. Geranium red has been found to contain as much as 20 per cent of lead. It is best, therefore, to use no artificially-coloured clothing next the skin, except black stockings, which are harmless, the dye for them being chiefly obtained from log-wood or indigo, and the natural colours of the wool are decidedly the best.

Heat Value of Colours

As regards the suitability of various colours for use in tropical climates, observations were made in the Soudan by a

correspondent of the *Lancet*. Two thermometers were placed in wooden boxes, one of which was painted black, the other white; they were left in the sun for one hour, at the end of which time the thermometer in the black box registered 117° Fahr., that in the white 102° Fahr.

In another experiment six thermometers, having two parts of new bunting of various colours wrapped round them, were hung up exposed to the sun for one hour, with the following results:—

Temp. of the air in shade	91° F.
,, thermom. covered with white .	106°
,, ,, ,, yellow .	109½°
,, ,, ,, red	110°
,, ,, ,, blue .	114°
,, ,, ,, light blue .	115°
,, ,, ,, black .	117°

Ten tin biscuit-boxes painted as below were exposed with thermometers standing up in them on the sides opposite to those turned towards the sun. Temperature of air in the shade, 88° Fahr. They were closed and left for about two hours. They registered as follows :—

1. White . .	100° F.	6. French gray . .	106½° F.
2. Yellow . .	103½°	7. Lead colour . .	109°
3. Red . .	104°	8. Dark green . .	110½°
4. Stone colour .	102½°	9. Light green . .	109°
5. Blue . .	106°	10. Black . . .	114°

Three square tin biscuit-boxes were next painted and white-washed variously.

Result

A. a. Painted white and exposed to the full rays of the sun . . . . 100° F.

	Painted French gray and exposed to the full rays of the sun . . .	111° F.
	Painted dark gray and exposed to the full rays of the sun	112° F.
A. b.	Painted with one coating of gray over white	108° F.
	Painted with two ,, ,,	116° F.
	Painted white and exposed to the sun .	100° F.
	Whitewashed ,, ,, .	98½° F.
B.	Biscuit-box painted French gray .	111° F.
	Over this one coat of whitewash .	102° F.
	With two coatings ,, .	96° F.
C.	Biscuit-box painted lead colour .	112° F.
	Over this one coat of whitewash .	103° F.
	With two coats ,, .	97° F.

According to Dr. Parkes, the material of clothes is of no importance as far as regards protection from extreme heat in the form of direct solar rays, and colour must be trusted to in this respect. White has the greatest protecting power, then gray, yellow, pink, blue, and lastly black. On the other hand, in the shade colour does not markedly protect against heat, and the thickness and non-conducting character of the material worn must be depended on.

With regard to the colour of clothing it is worthy of note that, with the exception of Prussian blue and chrome yellow, all colours have a more or less strong tendency to fade when exposed to direct sunlight, because they have an organic basis, and in its presence they give up their colouring matter to form colourless compounds with oxygen. Even aniline dyes, being produced from coal, are of vegetable—and therefore organic—extraction, and are subject to the bleaching effects of sunlight. Diffused light or ordinary daylight does not produce the chemical combination which causes dyed fabrics to fade. Light blue, lavender, and gray fade most easily; dark blue is the most durable—whence, doubtless, our preference for blue serge for sea-side wear.

The Material and Structure of Clothing

The subject of clothing is so important as to require dealing with at some length in the present treatise. Dress reform has made immense progress during the past few years; and we shall advance steadily towards a more sensible method of clothing ourselves when we fully recognise the influence that dress has upon our health and happiness.

In order to ensure radical reform in dress we must recognise several leading principles. These may be divided into two chief headings: *A*. the material. *B*. The structure of clothing.

A

1. The material of clothing should give the maximum of warmth with the minimum of weight.

2. It should allow the skin to breathe freely, so that its emanations may pass away into the fresh air, and the oxygen of the air may pass through the substance of the clothing to the skin.

3. It should be absorbent of moisture.

The only one material which furnishes all these conditions is woollen material; and I fully agree with the well-known authority, Dr. Jaeger, that wool is the natural and healthy substance which should be used for the clothing of human beings, as well as for the animals to which Nature has given it.

B

1. As to the structure of clothing, all articles of dress should be made so that they cover every part of the body without pressing upon it, and so as not to impede the action of the vital organs.

2. Clothes should give perfect freedom of movement to all parts of the body in order to impair its activity as little as possible.

In order to secure a rational system of clothing, the

best plan is to begin with the layette, for the reform of which I have been labouring for many years.[1]

Infants' Clothing

The ordinary baby clothing breaks almost all the canons which I have just laid down for healthy dress; the materials used are not absorbent, and do not allow free transpiration of the skin, being often starched. The warmth given is insufficient in proportion to the weight. The clothes are difficult to put on; they are not made high enough in the neck to keep the shoulders warm, and leave the arms entirely exposed.

Now what we want to obtain is, to have as few garments as possible, and to make these of very simple construction. The first thing is to abolish the linen binder, which cramps the internal organs, interfering with the digestion, and hindering the development of the heart, lungs, stomach, and liver. It is a relic of the ancient custom of swaddling infants, and should be thrown aside with other bygone superstitions.

To give this up, then, is the first step in advance, and for the ordinary flannel binder may be substituted a binder the pattern of which was given to me by a correspondent, and which has since been adopted by the Jaeger Woollen Company. It is made of Jaeger material (quality A), about three-quarters of a yard in length and $8\frac{1}{2}$ inches in depth. A fold of $1\frac{1}{2}$ inches is to be made at the bottom, and ironed down. A second fold is made over the first and ironed, so as to keep firm and smooth. The binder is then rolled up, the folded part being inside, and placed in readiness for use (see Fig. 14).

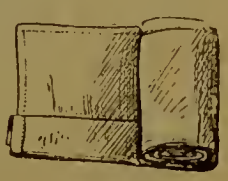

Fig. 14.

When it is put on, the fold is placed outwards at the lower part of the child's body, round which it is evenly rolled,

[1] See my lecture on "Children's Dress," delivered at the Health Exhibition of 1884, and published by Clowes and Sons.

and the corner of one end of the binder is tucked into the outermost fold at the bottom, the other corner at the top. If properly put on, this keeps firm all day, and there is no necessity either to sew the binder or to adopt the dangerous plan of pinning, which some nurses are foolish enough to do. Fig. 15 shows the binder in use.

Fig. 15.

Fig. 16.

This binder may be worn until the child is from eight months to a year old. The next garment is a little vest, which may be made of Jaeger K stockinette, half a yard of which makes two vests, and trimmed with lace round the neck and armholes, as shown in Fig. 16.

This opening at the back avoids bending the child's arms back in order to get them through the armholes, and it wraps over so as to keep in place. The measurements are about 10 inches in depth and 7 inches across the chest. Many nurses and mothers, however, prefer a little white woven vest for their children, which, if they are born in winter, is best made with long sleeves; and these are now obtainable at moderate prices. Woollen material may also be used for the diapers, and the three-cornered pilch used to protect them. Waterproof pilches should on no account be used for children; nor do I ever allow a waterproof sheet to be placed in a baby's cot, as the use of this material keeps the child in a state of perpetual poultice by preventing the evaporation of moisture.

The blanket measures 25 inches in length, and 21 inches in width at the bottom. It is 17 inches round the chest, and folds over at the back, as shown in Fig. 17, being tied with

silk strings. The Jaeger KK stockinette is the material for this purpose, and the bottom of the blanket is made to fold over, to keep the little feet warm for the first few months. It may be pinned with two strong safety-pins. After the first

Fig. 17.

month or so it may be fastened in front, as by that time having to bend back the infant's arms will not matter.

For this underclothing the gray colour of natural wool may be used, but most mothers dislike using it for the robe, as the little one looks so much prettier in white or

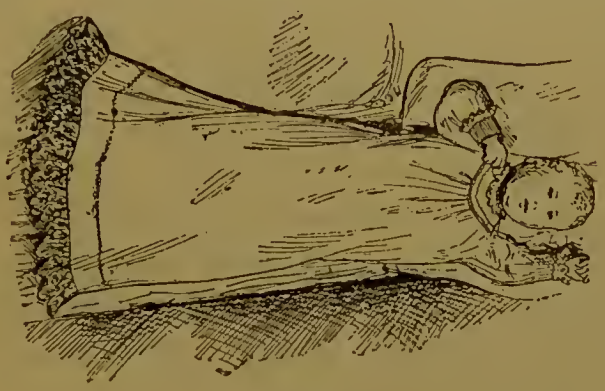

Fig. 18.

cream colour. For the robe, then, a good material is white stockinette, and a very pretty pattern is that shown in Fig. 18.

It is quite as pretty, if not prettier than the ordinary lawn and lace garment, and saves a great deal of money in

washing. This robe is manufactured from my pattern, and is 34 inches long, and 23 inches wide at the bottom, giving a circumference of 46 inches round. The chest measures 19 inches, and the total length of the sleeve is about 8 inches. By a neat little arrangement, however, the sleeve is ribbed at the bottom, so that it will fit closely round the wrist, and, if too long for the baby's arm, will give the effect of a bishop sleeve; or the little cuff can be turned back, as shown on the right arm in the illustration. Constructed on the same plan as the day-gown is the monthly robe, or night-gown, which can be made in the natural-coloured wool. The arrangement which I advocate here, and which is practically the same as that recommended in my book on *Health and Beauty in Dress*,[1] allows for growing; and a most important point with regard to it is that no change is required at the usual time for shortening, except to leave the blanket open at the bottom, and put one or more tucks in the skirt. This obviates the danger of colds, which are so frequently caught by infants when shortened at the absurdly early age of three months; and I found the plan work most satisfactorily in the case of my own child, who wore the clothing above described until she was eight months old, by which time she had outgrown it.

When the modified short-coating takes place as described above, the feet and legs are to be protected by long crochet stockings, reaching to the knees—another great advantage.

It is decidedly in the favour of the system here advocated that a layette so constructed is very much cheaper than an ordinary layette; for when complete all that is needed is four bibs, six shirts, four blankets, four night or monthly-gowns, two white day-gowns, six pilches, two head flannels. Half a dozen large-sized diapers, and a dozen small size are required if the woollen diapers are used. The cost of the whole layette does not exceed £7, as made by the Jaeger Sanitary Woollen Company; and I should think that if made at home there might be some little saving of money, although the time

[1] Published at 183 Strand, W.C. Price 1s.

expended upon the layette would have to be considerable. Those who wish to make the clothing at home can obtain paper patterns from the office of BABY: THE MOTHERS' MAGAZINE, 183 Strand, London, W.C.

At six to eight months the diaper can be left off, and little woollen drawers made with a flap can be used in their stead. See Fig. 19.

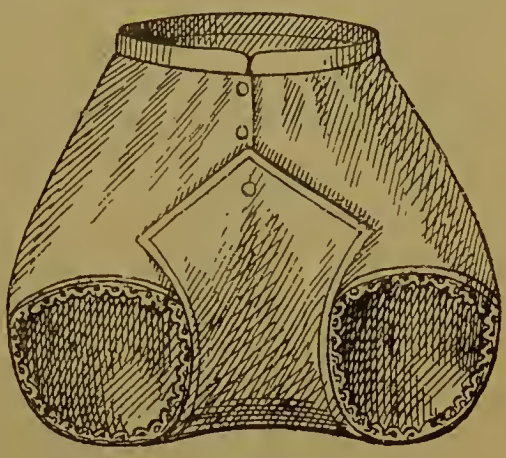

FIG. 19.

For out-door clothing I recommend a large white fleecy shawl and a knitted hood as the best for the first two months. Afterwards a little woollen smock or coat may be substituted for the shawl, so as to give the child free use of its arms. The ordinary smock shape is a very good one. The use of hoods for little boys, as well as for girls, should be continued up to the age of about eighteen months, as hats are very uncomfortable, preventing the child from lying easily in the perambulator, and also frequently disfiguring children's ears; while earache in little boys has been known to result from exposure of the ears to cold. The ordinary infant's cloak is very undesirable, as its weight hangs entirely from the neck and shoulders, and the weight is considerable, while the value in warmth is slight.

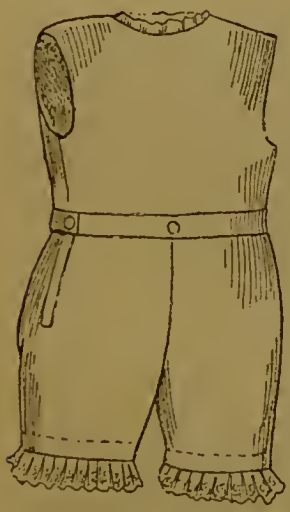

FIG. 20.

Children's Dress

When the first change from infant's clothing is made, little boys and girls should both be dressed

alike in woollen vests with long sleeves; over this should be a bodice on to which the drawers are buttoned. See Fig. 20.

If these are made of woollen material no petticoat is needed except in cold weather, and when the petticoat is worn it may be buttoned on to a second row of buttons on the bodice. Stockings should be fastened by a little strip of knitting to the side buttons on the bodice under the drawers. A little smock frock completes the costume. At about the age of three, combinations buttoning up at the back, as in Figs.

Fig. 21.—Front view.

Fig. 22.—Back view.

21 and 22, may be substituted for the drawers for boys, and a little jersey suit should be worn, which, with the addition of a pair of stockings, forms a perfectly ideal dress for young children. This costume might with advantage be adopted for little girls as well as for little boys, as it would give them so much more freedom of action than ordinary girl's clothes, and the differentiation of the sexes is surely not of much importance at so early an age.

I object to the plan of using stays for young children, as even quilted stays worn by infants are apt to drag on the shoulders. The corded stays worn by little girls, although they may not be stiff, do not yield to the figure, and are apt to slip down and press upon the pelvis, risking deformities of that important region.

I most strongly blame the large number of fashionable mothers who begin to pinch in the waists of growing girls at the age of about twelve, as by so doing they lay up a store of misery for the future of their daughters. During the period of growth pressure on any part is much more injurious than at any other time, and all corsets should therefore be discarded. It is not right, however, as some so-called "dress-reformers" have done, to advocate the removal of the weight of clothes from the waist, and to suspend it from the shoulders, as this is apt to cause stooping and even spinal curvature. The important matter is to distribute the weight evenly, as can easily be done by adopting much the same plan as that recommended for young children.

Women's Dress

Girls and women of all ages should wear a woollen combination, which for winter should be high to the throat and have long sleeves; a bodice without sleeves, on to which baggy drawers, made something on the Turkish pattern, should be buttoned; and a gown, made if possible all in one, on the model of the Princess robe. There are thus practically three layers of clothing, and every part of the body is warmly and sufficiently although lightly clad. Moreover, petticoats, which form such an obstacle to a woman in walking, are as far as possible done away with. Knickerbockers of cloth or tweed are excellent with walking costumes.

I do not believe in outraging the British matron by adopting the principle of the divided skirt, but if the underclothing be divided, not much harm can be done by allowing the outer skirt to conform to the prevailing fashion.

When corsets are worn, as in many cases they inevitably will be, these may be substituted for the bodice mentioned above; and drawers, or as I may call them the "divided underskirt," and any petticoat if desired, can be buttoned on to them.

So much has been said of the evils of tight-lacing, that the practice is now almost universally condemned; and although it is followed by thousands of women, when taxed with it they would all deny the imputation. Unless a woman is very slight, however, some kind of corset is necessary to support the bust, and prevent her from having that flabby appearance which we so often see in advocates of "dress reform," who too frequently resemble in appearance a particularly lively jelly-fish.

If a woman were dressed from birth on the principles I have advocated here, the muscles would doubtless be so firm that no corsets would be required; but for the majority, as at present found, the corset is indispensable, and it should be looked upon as a necessary evil to be modified as far as possible.

I will briefly rehearse the evils of tight lacing, so as to warn my readers against practising it themselves, or permitting their friends to do so. Having read in the preceding chapters about the structure of the human body, it is easy to see that pressure from corsets will injure, by hindering the action of the skin, the circulation in which they impede; and by weakening the muscles of the parts which they are supposed to support, more especially those of the back, inasmuch as they prevent the amount of movement necessary for the healthy development of muscle. Tight corsets act like splints, and a woman who has been accustomed to use them, when she leaves them off feels quite weak, owing to the fact that the muscles have lost power from want of use.

By tight lacing the ribs are pressed in and crush the lower part of the lungs, which they prevent from doing their full amount of work, thereby increasing the work thrown upon the upper part of the lungs. By this the breathing arrangements are altogether thrown out of gear, and tendencies to all kinds of lung disease are encouraged. Heart and stomach are deranged by pressure, the action of the liver is hampered, and the movements of the bowels are restricted. Those who know anything about physiology are therefore not surprised when

the woman who laces tightly complains of indigestion, headache, depression of spirits, lassitude, and pains in the side and at the heart. I believe that the wearing of tight corsets and tight boots are the two chief causes of anæmia which is so frightfully common amongst our young ladies, and which is due to insufficient aëration of the blood; the tight corsets hampering the purifying action of the lungs, and the uncomfortable boots militating against the proper amount of outdoor exercise being taken.

All the organs of the abdomen are displaced by pressure round the waist, and this produces many of the serious ills from which the fair sex suffer. In fact I have good reason to believe that most of the so-called "diseases of women" arise from this cause; that childbirth is rendered more difficult, miscarriage more common, and that displacement, piles, and varicose veins are frequent results. But although fully cognisant of the evils of tight lacing, it is not absolutely necessary to rush to the other extreme, and throw away the corset altogether. It should, however, be very carefully made, so as to be moulded to the figure, and to supply support where required, and can then do no possible injury. Where corsets are altogether discarded, the bust may be supported by the arrangement shown in Fig. 23, which is copied from the Chowli worn by Indian ladies.

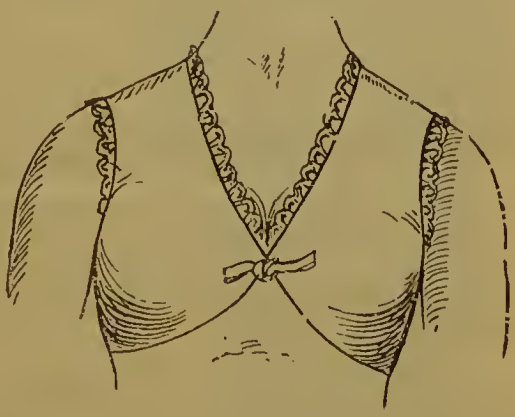

Fig. 23.

To come now to the outer garment. The jersey or blouse bodice is best, as it gives freedom to the movements of the arms and chest; and whatever way the dress is made, it should fit loosely enough to allow the lungs to expand freely, but

not too loosely, as in the latter case the weight is not evenly distributed. When dresses are fitted on, they should be tried when the purchaser is sitting down, as well as standing up, and a variety of positions should be adopted to see whether the costume is perfectly comfortable. The dress bodice should permit both arms to be raised straight up over the head. With woollen underclothing and corset, and a woollen dress lined with Jaeger woollen lining, a woman is as protected and comfortable as a man in his flannels.

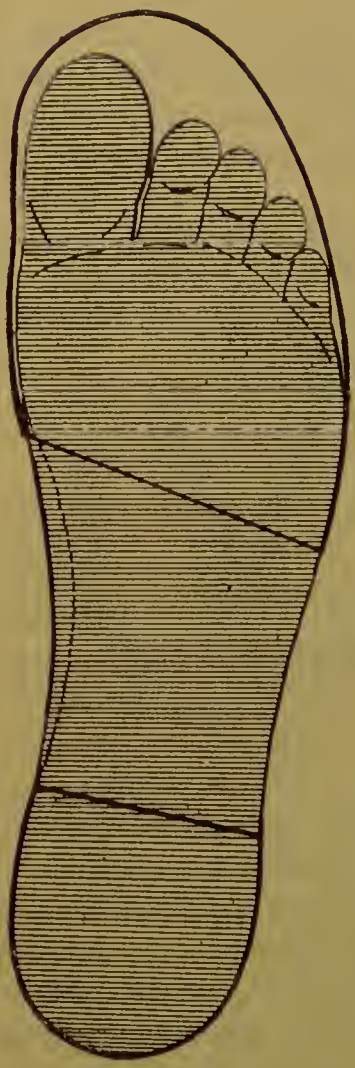

Fig. 24.

I am no advocate for dowdiness in dress, but I would here remark that the trimming of dresses should be as light as possible, so as to conform to the rules which I laid down in the beginning of this chapter.

Beauty of form and colour should never be marred by want of attention to health, convenience, and suitability, or by extravagance. Every individual should adapt her dress to what she finds most becoming to herself.

The structure of boots for both sexes is very important as regards health; for if the feet are not perfectly comfortable, exercise becomes difficult and the whole system suffers for want of it.

The crusade against high heels and pointed toes has been waged for a long time, and it is possible now to obtain better boots than could formerly be had. But even now bootmakers

have by no means attained perfection in the art of making coverings for the feet.

One rarely sees a naturally-formed foot; and even in pictures we can see that the models have been to a certain extent deformed by having the great toe pressed inwards. To buy ready-made boots is as a rule a mistake, since each individual has a foot as distinctive of him or herself as the face or the hand. If we take a sheet of white paper, put it on the ground, and stand with the naked foot upon it, the exact outline of the foot may be taken if we get some one to pass a pencil carefully round the edge. The outline of each foot should be taken separately, and this should form the basis from which the boot is to be made, as shown in Fig. 24.

The heel should be low, and placed exactly under the natural heel. The inner side of the boot should be straight, and plenty of room should be given in the upper leather, for many boots, which are otherwise of good shape, crush the toes together owing to insufficient room being allowed in the upper part. The toe should be of the natural breadth; and the waist of the sole, which ought to correspond with the arch of the foot, should possess a certain amount of elasticity.

Boots made with cloth uppers and a golosh of leather fixed to the sole are to be recommended, as they allow the foot to transpire better, and are therefore more healthy wear than those made entirely of leather.

A valuable feature introduced in the Jaeger sanitary boots is by lining them throughout with a light but strong *undyed* woollen lining. It is useful in cold weather by surrounding the foot with a non-heat-conducting medium, while in warm weather the lining is more pervious than the ordinary cotton lining to the perspiration of the foot. These boots and shoes are also ventilated.

In cases where deformity of the foot, such as bunion, the bending of one toe over the others, corns, and soft corns between the toes, have been induced by wearing improperly-made boots, the use of a stocking made with separate divisions

for the toes, just as gloves are made with separate divisions for the fingers, is highly desirable. Such stockings are sold by the Jaeger Sanitary Woollen Clothing Company, and should also be worn when there is any offensive perspiration of the feet.

The use of improperly-made boots is not entirely confined to the female sex, and men seem to suffer from this cause—arising from vanity—almost as much as women; but the pinched and anxious expression of the face, which is apt to result from the wearing of tight and uncomfortable boots and shoes, may be set off against any supposed increase of beauty derived from that cause; and to be perfectly well at ease is certainly preferable to having a foot apparently smaller than Nature has intended.

Dress for Men

Men frequently laugh at women for the injury they do themselves in the service of vanity, but men's dress is not wholly free from certain objections.

The first thing that a woman dress-reformer would attack in male costume is the chimney-pot or topper hat, which is one of the commonest causes of baldness in men, as it presses on the arteries that feed the scalp, and by interfering with the supply of blood injures the condition of the hair, while it is also practically impervious to air. It contains a certain quantity of stagnant air which acts as a sort of hot poultice on the head, and is also poisoned by the excretions of the skin of the head. The same remark applies, of course, to riding-hats worn by women.

The only merit that can be urged for the chimney-pot hat, as far as I can see, is that in case a brick were to fall on a passer-by who was wearing one, it would protect his head from injury; and Sir Edwin Arnold has drawn my attention to another use to which it may be applied, by telling me that when travelling he uses his topper hat as a writing-desk. If all men were to keep their "tiles" for this purpose, they would

certainly be better off as regards their hair, and would also be less subject to headaches.

Unless in cold climates, the head does not require a warm covering, and the lighter and more easily ventilated the hat is, the better.

Hats should not press upon the head : should be lined with flannel instead of leather, and should be well ventilated. The ordinary ventilator on the top of the hat is useless, as to ensure a current of air there must be an inlet and an exit. The best plan for ventilation is to have several just above the ribbon of the hat in addition to that in the top of the hat. Lightly-made straw hats are good for men, but sailors' hats covered with shiny waterproof material, as they prevent transpiration from the skin of the head, are injurious to both sexes.

Another objectionable article of male dress is the ordinary brace, which tends to encourage stooping by dragging on the shoulders, and thereby narrows the chest. Some well-meaning dress-reformers have tried to introduce the brace as an article of female attire, but it would be far more injurious to women than to men, by pressing against the breasts ; and the arrangement of a bodice indicated above is better.

I have been told by a very experienced cutter, that if trousers are properly cut, there is not the slightest necessity for braces. They should be fitted well over the hips, and held in place round the waist by a firm hook. Brass and sharp-edged trouser buttons are objectionable, as they may lead to injury, and possible poisoning of the skin. Bone buttons are preferable.

The ordinary shirt front and collar stiffened and glazed are objectionable on the ground of not permitting free transpiration. A woollen shirt and Byronic collar is the healthiest form, although, perhaps, it may not look the neatest. While I am on this subject I may refer to the importance, first pointed out by Dr. Jaeger, of using a woollen in place of a cotton lining for the waistbands of trousers : woollen pockets are also much more comfortable than cotton.

In dress for sports a more sanitary plan has become popular than in clothing for ordinary wear, as flannel shirts are adopted and no braces are worn, while the head is lightly covered. I have, however, seen cases of baldness resulting from the friction and warmth of cloth bicycle caps in which the outline of the cap was actually shown on the head.

Colds are often caught by men, and sciatica and rheumatism induced, by evening dress, as the evening waistcoat is cut so much lower than the morning waistcoat, and the hips and abdomen are exposed much more than by the frock or morning coat. For evening dress, except in warm weather, it is therefore desirable that a flannel should be worn over the chest under the shirt front, and that extra drawers should be worn to protect the lower part of the body; while both for men and women it is important that warm wraps should be worn when leaving heated rooms. I have often seen women who, when they go out during the day in winter are swathed in furs, and wear warm hats, go out in the evening with simply a light shawl round their necks, and nothing whatever on their heads, this being a frequent cause of disease.

CHAPTER XI

THE BATH

Although open-air bathing must, from the nature of things, have been the first kind of bathing indulged in by the human race, as by the lower animals, the use of warm, vapour, and hot-air baths was very extensively adopted amongst the ancients. The idea, as Erasmus Wilson suggested, probably arose from the heated rock and vaporisation of water, and, doubtless, hot bathing of every kind was first suggested by the hot springs which are to be found all over the globe. As we know from Homer, the warm bath must have been used by the Greeks more than three thousand years ago, and inunctions of oil were used after the bath in order to render the skin supple. The Greeks converted their hot springs into capacious baths, and were famous for cures attributed to the use of them. The Jews also used hot baths for curative purposes, and the Romans brought the idea of the hot bath back from Greece.

Suabo speaks of the baths which he found at some hot springs between Clazomene and Smyrna; and in Hierapolis thermal baths were also found.

The hot-air bath became attached to all the splendid gymnasia in Greece, and this bath was not exactly like that known as the Turkish bath; but according to Seneca it would appear that the baths were a species of warm-water bath, with a sweating-room attached. These sweating-rooms

operated by means of dry, heated air, and this was the origin of the hot-air bath, commonly known as the Turkish bath.

The Romans learnt to heat these baths from the Greeks, and built fires under the floor of the bath, so as to produce hot, dry air. This under fire, on the same principle as that by which our Turkish bath is heated, was also used by the Romans to heat their houses.

The structure of the ancient bath was very similar to that of the Turkish bath of to-day, and consisted of the *vestiarium*, where the undressing and dressing were performed; the *tepidarium*, or moderately-heated room; the *calidarium*, or hot room; and the *laconicum*, which was the hottest of all. This last, however, was very seldom used. Having passed through these rooms the *frigidarium* was reached, where the bather was douched with cold water and allowed to dry. The Romans were so inclined to indulge luxuriously in these baths that an edict had to be issued limiting the time permissible for a bath to two hours.

The Turkish Bath in Constantinople has been conducted on the same plan for many centuries. It consists of three parts: an outer hall open to the sky, where the bather strips, binds a towel round his waist, and another round his shoulders, and places a third over his head. Then, with his feet protected by wooden shoes, he enters the middle chamber, which corresponds to the Roman *tepidarium*. He lies there on a marble slab, chatting, smoking, and drinking coffee, till the warm air puts him into profuse perspiration. He then passes on to the third chamber, corresponding to the *calidarium*, where he finds the temperature higher and the vapour increased by water which is constantly thrown upon the pavement.

Here he lies down on a marble slab and is shampooed, the limbs and joints being stretched and the muscles pressed and pinched, after which he is scrubbed down by an attendant with a camel's-hair glove and a little water, the loosened

skin and particles of refuse matter coming away. He is next soaped with a wisp of palm, and the operation is completed by his being douched from head to foot with warm water. He now wraps himself in towels again and returns to the hall where he left his clothes; there he lies down and is fanned by an attendant. The atmosphere is not so hot as in the Roman bath.

This process lasts three or four hours. Practically, this plan is that adopted in England in the Turkish baths, except that none of the chambers are open to the air; and it is curious to note that it is not fifty years since the first Turkish bath was built in the British Isles by Mr. Urquhart, at Blarney, in Ireland. This was followed in England by Mr. Crawshay's bath in 1847, but now one or more may be found in almost every town; and the practice of taking Turkish baths is becoming more popular every day.

The purpose of the Turkish bath is to stimulate the functions of the skin, and to remove the effete matters by perspiration and friction. By this means it preserves health and cures various diseases, such as colds and coughs, whether in their acute or chronic form, rheumatism, gout, some kinds of indigestion and affections of the bowels, chronic diseases of the liver, spleen, and kidneys, piles, depression of spirits, irritability of temper, sleeplessness, and many diseases of sedentary and fashionable life, such as obesity, and those caused by effete matters in the blood.

The artificial way in which we live, covered with clothes which exclude air, and choking our systems with unwholesome food, render a means of clearing the blood such as this of very great value; and the whole purpose of the bath is to help the skin to act by warming, relaxing, and leading to prolonged perspiration.

Although very high temperatures can be borne when the body is perspiring freely, the best temperature is from 120° to 140° Fahr. When we go above this to a temperature of 150° the extreme heat dries off the fluid from the surface, and

by hardening the epidermis instead of softening it, interferes with its removal. The temperature of the *calidarium* or hot room is, as a rule, between 130° and 140°, and many habitual bathers make their way at once to one of the hot chambers, returning in ten minutes or so to the cooler room. Beginners, however, should not attempt to go into the hottest room, but may remain from twenty minutes to half an hour at the first visit, and afterwards, from one-half to three-quarters of an hour in the *calidarium*, where they may facilitate perspiration by taking frequent draughts of water. When the skin is perspiring freely it is time to be shampooed, and it is not wise to attempt to increase the perspiration by entering the hotter atmosphere even for a moment. If it is visited at all it should be before, and not after, this stage, because, as stated above, when perspiration has once begun, the effect of greater heat would only be to dry the skin.

The Englishman, following the example of the ancient Roman more than that of the luxurious Turk, has either a cold douche or plunges into a bath of cold water before returning to the *frigidarium*; but if there is difficulty in reaction the cold douche or plunge is not advisable, especially for beginners, but it is well to have a spray, beginning with warm water and gradually cooled, applied all over the body.

In the hot rooms a cloth soaked in water should be placed about the head, which will prevent headache, and the eyes should be frequently bathed. When palpitation of the heart is caused by the warmth of the bath, or oppression in the head is felt, a basinful of tepid water should be thrown over the head.

Bathers should never return to the cooling-room until after the douche, and when resting they should lie down and not talk too much, but should avoid all excitement and keep in a quiescent state. They should not take any physical exercise, and should allow quite an hour to elapse before going about the business of life again.

Sometimes the air of the cold room strikes a beginner as

rather chilly, and he would then do wisely to return for a few seconds to the warm room; but the chilliness of the air will not do any harm provided he is covered with wrappings, as is usual.

Bathing at Home

The advantages of the Turkish bath have been made very clear by what I have said above; but it is, of course, not always possible to go to a public bath, and in the case of those who are not strong enough to risk the external air after a Turkish bath, or who live at a distance from such an institution, or for dwellers in country-houses, a portable Turkish bath is a great boon. Many are not aware that such a convenience exists, and for the benefit of these I am enabled to describe the bath, and to make the mode of using it clear, by illustrations kindly lent to me by the inventors, James Allen & Son, of 21 and 23 Marylebone Lane, Oxford Street, W.

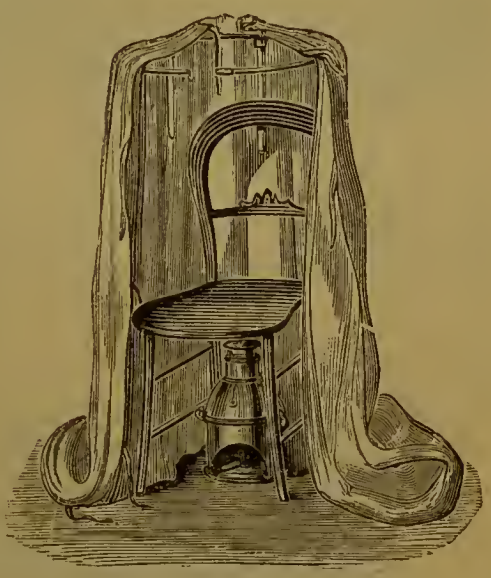

Fig. 25.

This apparatus may be used for a hot-air or vapour-bath, or for the administration of medicated or mercurial baths, and may be obtained at the low price of £2 : 10s.

Fig. 25 shows the apparatus fixed ready for use, the lamp being placed under the chair, on the top rail of which is secured a socket supporting a rod and a ring, upon which a cloak is adjusted. The rod slides up and down in the socket, so as to adjust the ring to the height of the person who is to sit in the chair.

The person about to take a bath sits down, slips the two

ends of the hoop together, and draws the cloak round, tying it down the front with strings, and adjusting it round the neck (see Fig. 26).

Fig. 26.

The bath may thus be taken comfortably for from 15 to 40 minutes; and the great advantage which this method has over the ordinary Turkish bath is that, while benefiting from the steam and the warmth, the bather is breathing pure air—the air in the chamber of an ordinary Turkish bath being frequently very unpleasant. The eyes and the hair are also not subjected to the unpleasant and injurious influences which the great heat of an ordinary Turkish bath often has upon them.

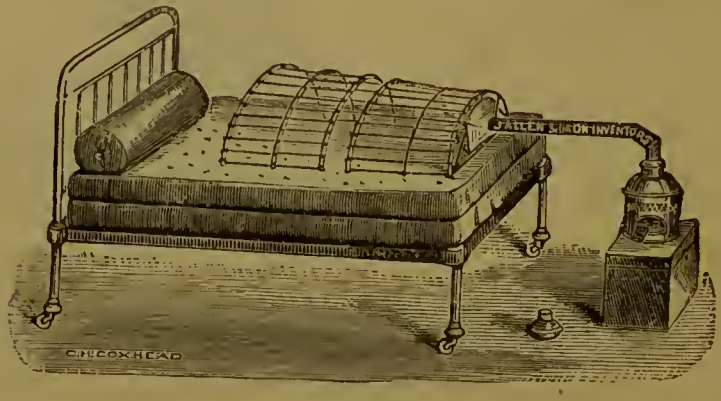

Fig. 27.

The apparatus shown in Fig. 26 differs rather from that shown in Fig. 25, in that the lamp is *outside* the cloak, and

in this form can be used by those who are too nervous to relish the idea of sitting over a lighted lamp, as some people perhaps might be, although the lamp shown in Fig. 25 is quite a safe apparatus.

Another modification, shown in Fig. 27, which is slightly less expensive than that shown in Fig. 25, is adapted for the use of invalids who are confined to bed, or of those who wish to be luxurious, and take their bath lying down instead of sitting; and very great comfort is derived from the use of this adaptation in bad cases of rheumatism, sciatica, and other painful diseases where rest in bed is necessary, but great relief is obtained by perspiration.

The Daily Bath

The custom of taking baths in the house is by no means so ancient as that of public bathing; but it has now become so general in England that the daily tub is an important matter of routine with most middle-class people, and in even the cheapest houses now built the bathroom is considered a necessity, although in those of thirty years back and more such a thing is hardly ever to be found, even in handsome mansions.

The recognised temperatures for different baths are as follows :—

Bath.	Temperature of Water.
Cold	30° to 65° Fahr.
Cool	65° ,, 75° ,,
Temperate	75° ,, 85° ,,
Tepid	85° ,, 92° ,,
Warm	92° ,, 98° ,,
Hot	98° ,, 112° ,,

The Cold Bath.—The cleansing influence of the cold bath is by no means so great as that of the warm or Turkish bath, but the cold bath acts beneficially as a tonic to the skin and

internal organs. The cold drives the blood inwards to the internal organs, thus stimulating circulation in them; and in ordinary health, as soon as the bather leaves the cold water, a reaction sets in by which the skin is thrown into a glow of warmth and its functions stimulated. In many people, however, this reaction does not take place. The nerves must not then be shocked so roughly by the contact with cold, as an actual shrinking from the cold water takes place. Where the reaction is not good, especially in young, anæmic girls, it is most unwise to persevere with cold baths, as much harm may be done. About the time of puberty it is unwise for cold baths to be indulged in by girls, as they may give rise to disturbances in the developing system and check the oncoming change; but cold bathing is good for boys at the corresponding time. In young children also, cold baths are apt to induce certain states of ill-health, such as bowel complaints and diarrhœa, and although where the cold baths agree they should be adopted, it is most unwise to say, as I have heard mothers say: "We will accustom the children to cold-bathing, and in time it will agree with them." If a change is to be made by giving cold baths, the temperature should be lowered gradually, so that there may not be any great shock to the system. In the case of delicate people and children, it is often a good plan to sit in a warm bath and pour a stream of cold water down the spine by means of a sponge or watering-pot. The application of a cold sponge over the liver is also often of service.

It is a great mistake ever to stand in cold water. The best plan is to get into the tub, sponge oneself over rapidly and jump out again, the whole operation not taking more than about a minute.

The Shower Bath is not so popular as formerly, but may still be found in many houses. It is of great service for people in ordinary health, as the reaction after a shower bath is, as a rule, very good; but for delicate girls, and feeble persons or children, the shock of this bath is far too great.

The Tepid Bath is most suitable for young girls at the ages mentioned, as well as for those in delicate health, and may be taken daily with advantage.

It is very important that, whether for cold or tepid baths, the water should be soft. Rain-water is the best to use; but if this cannot be obtained, the water should be softened, as hard water injures the skin, rendering it coarse, rough, and scaly, as well as wasting the soap. Hard waters are those which contain an excess of salts of lime and magnesia, while in soft waters these are absent, or nearly so. Carbonate of lime, which is held in solution by the presence of free carbonic acid, is the chief ingredient which hardens the waters supplied by the London companies. These can be rendered softer by boiling, which process drives off the carbonic acid gas, and renders insoluble the lime salt, which falls to the bottom of the vessel and forms the deposit which we find in our kettles and boilers.

A simple way of softening hard water is to add a little ammonia. A very excellent preparation of ammonia, called Scrubb's Cloudy Household Ammonia, has recently been introduced, a small amount of which added to the bath renders the water soft, stimulates and refreshes the skin, and facilitates the removal of the effete excretions of the skin. When this preparation is used, the amount of soap required will be very much decreased.

Soap.—In the choice of soap a considerable amount of care is required, as many soaps contain substances which are absolutely injurious to the skin. The hard soaps used for domestic purposes are generally made by boiling animal or vegetable fats or oils with caustic soda. The carbonate of soda, known as soda ash, when boiled with water and slaked lime, parts with its carbonic acid, which unites with the lime. The compound resulting is the insoluble carbonate of lime, while the caustic soda remains dissolved in clear liquid. This liquid is drawn off, and concentrated by boiling until the required strength is obtained. A weak solution is first boiled

with the fat or oil, and strong lyes are added from time to time, finishing with a solution of salt and water which causes a number of small granular particles to rise to the surface. These have been freed from oily properties, and are soap. By draining off the spent lye and boiling these particles with a strong lye, the soap is separated in granular masses, and is afterwards pressed in moulds.

Soaps are also obtained by using potash instead of soda, and a solid fat. Potash is generally confined to the preparation of soft soaps, and owing to its caustic nature soft soap is unfit for general use.

Cocoa-nut oil is used in making marine soaps because it is not rendered insoluble by brine, and will therefore lather when used with sea-water.

The two substances employed in the manufacture of soap are neither separately adapted for the purpose of cleansing the skin. Caustic soda, being strongly corrosive, dissolves the cuticle when applied to it, and the oils and fats being incapable of mixing with water, are unsuited for washing purposes. The two react chemically, however, as described above, forming a compound in which the distinctive qualities of each disappear, the result being harmless to most skins. Readily soluble in hot water, and capable of mixing with cold water, soap acts in the following way :—When dealing with the skin, I showed that dirt adhering to the body is composed generally of dust and other outside matter, combined with perspiration and the greasy excretions of the skin. When ordinary hard soap is brought into contact with water it decomposes and removes from the skin the greasy dirt, rendering it capable of mixing with the water used for washing. The more soda is diluted the less is its caustic effect on the skin, and therefore plenty of water should be used when the skin is washed with soap.

The purest *curd soap* is made from tallow and soda ; and if well made is good.

Castile soap contains olive oil, mixed with linseed, poppy,

or ground-nuts, and a veined appearance is given to it by adding soda lye containing a small amount of sulphate of sodium. The white Castile soap is the best.

Castor-oil soap is made from castor-oil and soda.

Cocoa-nut oil is made by boiling the crushed fruit of the cocoa-nut palm; and soaps made with it absorb nearly three times as much water as ordinary soap and make a good lather.

Palm-oil soap is made from oil yielded by boiling the fruit of the Guinea palm; and this oil is frequently used in toilet soaps, and is very serviceable.

Lard and soda make a good white soap, free from unpleasant smell.

Spermaceti soap, made from spermaceti and soda, is very emollient.

Common yellow soap is a resin soap, made with resin, soda, and tallow. If the resin is in too large quantity, the soap has an irritating effect on the skin; but it will be found that if it be made with excess of resin it is not firm, so that those who use it can tell when it is of inferior quality. Many kinds of inferior soap are made with a solution of silicate of soda substituted for a great part of the tallow, palm-oil, or other compound.

Toilet soaps all consist of some of those mentioned above, melted again, coloured, and scented; and as some injurious ingredients are frequently used for colouring the soaps, while no virtue accrues from the colouring matter, it is well always to use a white soap. Strong scents should also be avoided.

A very excellent soap which has been introduced recently and has very quickly become popular, is known as Scrubb's Antiseptic Skin Soap, which lathers remarkably well and does not have any irritating effect on the skin. It is pleasantly and delicately perfumed.

The use of a flesh glove for rubbing the skin in the daily bath is indicated except in the case of very delicate skins; and where sponges are used these should be kept absolutely

clean by washing them occasionally with an antiseptic solution. In buying sponges, those should be selected which have the sand in them and are of firm, even texture. It is said that the sponges used for operations in hospitals are sold to the shops and retailed to the general public. This is not at all a pleasant idea; but such sponges have obviously been soaked before purchase. All sponges should be left to soak in water containing a little borax before being used for the first time.

There are certain rules which may be, with advantage, adopted with regard to the bath. A full bath should never be taken less than half an hour before a meal, or two or three hours after a hearty meal. The cold bath must not be taken unless the feet are warm; and it is a good plan to sponge over the feet with warm water while taking a bath. Cold water should not be drunk while taking a cold bath, but it may be sipped freely while taking a hot bath. After bathing, if the skin feels irritable it is a good plan to rub a little olive oil scented with oil of cedar over the surface of the body. The ancients, who always practised inunctions of oil after bathing, were familiar with the value of this. The feet should not be allowed to become chilled during bathing; and exercise should be taken immediately after a cold bath, if possible.

Delicate people and invalids ought to avoid extremes in the temperature of baths, the shock of douche or shower baths, and should not take long for their baths.

Where a tonic effect is required the cold bath is, as a rule, the best. Where it is desirable to cause perspiration, the warm bath is the best. Cold baths should be taken in the morning, hot baths at night.

A good ordinary temperature for the bath is 75° Fahr.

There are one or two kinds of baths to which I have not yet referred, and these are local baths, applied for certain purposes to various parts of the body, as, for example, very cold or hot baths applied to sprains; internal douches for various diseases of women; hip baths, which, if cold, should be taken with the

feet in a basin of hot water; wet packs, made by wrapping the patient in a wet sheet or towel and afterwards rolling in a blanket; and medicated baths. A wet towel rubbed over the body forms a useful substitute for the sponge bath for delicate people who cannot stand the shock of immersion, and if the water is cool, the power of reaction will be increased, and the susceptibility to chilliness be diminished. The addition of sea-salt or Scrubb's ammonia to ordinary baths makes them more stimulating; and sulphur, arsenic, mercury, and other drugs are, of course, added for various medical purposes into which it is not necessary for me to enter here.

The various mineral baths which are so much in favour on the Continent act chiefly as stimulants to the skin and nerves, as mineral matter itself cannot be absorbed by the skin; and the value of the bathing treatment as practised in Continental and some home health resorts, depends to a large extent on the air and sunlight and strict regimen which the patients experience.

The value of the sun bath is indeed insufficiently estimated. Some physicians have suggested that by the exposure of the naked skin to the sunlight very satisfactory results may be obtained; and in one or two places the practice has been adopted, as, for example, in one sanitorium I have read of, where delicate children are allowed to play quite naked in a glass house into which the rays of the sun enter freely.

It is the healthy action of the sun on the skin which gives the chief value to open-air bathing. Much of the benefit derived from sea and river-bathing being due to its agency.

CHAPTER XII

SEA-BATHING

I HAVE noticed that the last few years sea-bathing has not been so universally recommended by medical men as it was during my childhood; and a sort of reaction seems to be taking place in this respect. If wisely used, however, no recreation is more advantageous to a healthy person than sea-bathing—especially when, as ought to be more generally the case, the bather is also a swimmer, or very sensibly elects to learn to swim. I, therefore, think it well to devote a chapter to this subject, so that my readers may not suffer from any of the many evils caused by injudicious bathing, which may easily bring on or increase ill-health, and derange important functions, but may be able to reap whatever benefit they can from this pastime which is such a favourite during the autumn holidays.

The practice of sea-bathing as at present carried out is of quite modern introduction. Immersion in the "salt sea-waves" was by no means regarded as a pleasure by the ancients, and was indeed used as a method of punishment by the Arabs, and during the Middle Ages. It was about the middle of the last century that the curative properties of sea-water were first recognised in England, when scrofula, the disease commonly called "King's Evil," was very prevalent. Sufferers who lived by the sea-side, as if guided by instinct, bathed themselves in the sea, bound up their sores with sea-

weed, and even drank sea-water. A certain Dr. Russell, a Court physician, having observed favourable results from this course of treatment, recommended it to his patients, and further cures were worked. So popular, in fact, did the new remedy become that in a few years the sea-coast was studded with rising towns and villages established for the use of visitors and patients, who arrived in crowds to patronise sea-bathing; and in a short time it came to be recommended, not only for scrofula, but for all sorts of diseases and complaints, in fact, as a kind of panacea.

Now, unfortunately, there is no one medicine nor line of treatment which suits all complaints and constitutions, and there can be very little doubt that an immense deal of harm has been, and is still being done by indiscriminate sea-bathing. As a general rule, healthy adults can bathe in the sea without risk and with advantage, provided they adhere to a few simple rules which I shall hereafter specify; but if the circulation is feeble, or if there is any weakness of the heart or lungs, sea-bathing should never be indulged in; and it should be given up by all who feel chilly or suffer from headache and lassitude after an immersion of moderate duration. The injury in all such cases seems to arise from the shock of cold which is produced by immersion; and cold baths, whether in the sea, river, or bathroom, should not be taken by the aged, by those in whom a warm reaction does not take place after the bath, nor by any who suffer from any kind of heart disease, or from inflammatory diseases of the lungs, kidneys, or liver. The action of external cold is, by contracting the small arteries, to throw the blood back from the surface of the body, and drive it into the internal organs, by the engorgement of which inflammation is readily promoted or even caused. Inflammation of the lungs is very apt to arise in young children from this cause. As in healthy young children, however, the powers of reaction are very good, they do not suffer very generally from cold baths, if rapidly performed and provided they are not afraid of the water; but

an immense amount of injury is inflicted by forcing the poor mites into the sea, in spite of terror, cries, and struggles, under a mistaken notion that it is for their good. Those who enter the sea under the influence of strong emotional excitement, such as anger or terror, will derive harm, and not good, from their bath; and no child or person of whatever age should be forced into the water against his or her will. From neglect of this principle, convulsions may be caused in young children; and in an older child I have come across a very bad case caused by neglect of the natural instincts. A father was determined that his boy, who was between eleven and twelve years old, should learn to swim, but the boy showed the utmost terror of the water, and could not be prevailed upon to enter it voluntarily. In order to overcome what he considered an absurd form of obstinacy, the father engaged a swimming master, who, as is often done, rowed the boy out in a boat, tied a rope round him, and threw him into deep water for his first lesson. So great was the agony of terror endured by the poor fellow that when he was brought back to land he had become a hopeless idiot. With regard to age, infants under two years old are too weak not to be harmed by the shock of immersion in the sea, and if they are not strong cold bathing at home may be injurious to them, and even to much older children.

While speaking about children, I must just say a word or two about the favourite and widespread practice of paddling, which I cannot but think injurious. The cold water about the feet and legs, by contracting the capillaries and small arteries, as I have said, must keep the blood in the upper part of the body, which is warmly clothed, and in the head and neck, which are too frequently subjected to the direct rays of the sun. Hence the vessels of the internal organs, the spinal cord and brain, are liable to become engorged, and inflammation, headache, and still more serious nervous symptoms are very apt to arise. If the child is to go into the sea at all, let it go in altogether, and be sure to wet the head first. The last

is a very important rule for adults if they wish to avoid headache, caused by surcharge of blood in the head, which in apoplectic subjects may very easily cause a fatal stroke.

The shock of the first plunge into cold water drives the blood to the central parts of the system, but immediately afterwards a reaction takes place and produces a feeling of pleasant warmth. The stay in the water should never exceed this period of excitement; and if the water is left while the warmth continues and the body quickly rubbed down, the healthy glow does not subside. Too long a stay, I must again insist, must always be avoided, and its effects are especially debilitating in fresh water. Do not be induced by a friend who has entered the water after you to stay in until she has finished her bath; do not wait in the water till all the children, one after another, have had their dips, and do not say you must wait till the swimming teacher is ready to give you your lesson; do not go into the water until he or she is at liberty.

Persons subject to fits of any kind are liable to be dangerously affected by the shock of a plunge into cold water, and these, if they bathe at all, should wet the head first and wade into the water. The majority of bathing fatalities supposed to be from "cramp" are really due to sudden stoppage of the heart's action. Dr. Ziegler has urged medical men to give as much publicity as possible to a "warning symptom" which consists in a deep red coloration of the skin of the bather. This being a sure foreteller of fainting and heart weakness, the bather who perceives it in him or herself must at once go on shore, although feeling well at the time. This symptom was first pointed out by French military surgeons; and by attending to it many lives may be saved. Directly it is noticed, the bather should leave the water. Sometimes the shock of the water—as in a case which has come under my notice of an elderly gentleman suffering from fatty degeneration of the heart—sometimes over-exertion in the water, and sometimes an affection of the emotions, is sufficient to

cause fatal stoppage of the heart's action. The latter cause operated in the case of a young man who died some time ago at Thames Ditton. He was bathing with a friend, both being fairly good swimmers, when the friend suddenly called out for help. He swam to him and succeeded in saving his friend's life, but he himself died immediately on leaving the water, the emotional strain, exertion, and excitement of struggling for another's life having been too severe for him.

Whoever is subject to earache, or inflammation of the ear, must also be very cautious in salt water. A dive has been known to be followed by rupture of the tympanum, or "drum" of the ear, owing to the sudden pressure on this delicate membrane caused by the rapid passage from air under water. In persons who have suffered from discharges from the ears, as, for example, after scarlet fever, and in whom the drum of the ear may be perforated or irritable, abscess of the brain has been known to follow a sudden dive or violent plunge of the head under water. A very eminent English judge died from this cause. Incoming waves should never be received in the face or ears, as rupture of the drum, inflammation, and deafness may result from neglect of proper precautions in this respect; and another curious disease of the ear, caused by too frequent plunges, is ivory exostosis,—a hard, bone-like growth which forms in the ear, and is most difficult to remove. A precaution which all bathers should take is to stop the ears with cotton-wool before plunging the head under water. Mr. Samuel Sexton has said that the momentum of tidal waves is often sufficient to drive the water up the bather's nostrils and through the Eustachian tubes into the ears; and it is possible that damage may be done in this way, since we cannot keep both nose and mouth closed, as some marine animals do. He once saw a person go into the water with his nostrils closed by means of a clothes pin; but this is a precaution which I think it would be useless for me to recommend to my lady readers.

Still another warning, and this time about the danger of

bathing when heated, which is apt to cause nervous disturbances and skin eruptions. One soldier's hair turned perfectly white after imprudence in this respect, while another was attacked by total paralysis of the tongue. A third dreadful example is that of a lady, who, after bathing when heated at a well-known watering-place in the Salz Kammergadt, returned home with a violent headache, and within three days became totally blind.

Sea-bathing is more bracing than river-bathing, owing to the invigorating effect of the keen salt air and the salt water, and a bather can generally remain longer in salt than in fresh water without injurious effect. The same rules are, however, applicable in both cases, and the following, which have been carefully drawn up by that excellent body, the Royal Humane Society, should be learned by heart and borne in mind by every bather.

1. Never bathe within two hours after a meal.

2. Never bathe when exhausted or in ill-health. The practice of plunging into water after exercise is to be thoroughly condemned.

3. Never bathe when the body is cooling after perspiration; nor, I would add, when actually and sensibly perspiring.

4. A morning bathe may be taken by those who are strong and healthy before breakfast on an empty stomach.

5. The young or those who are delicate should bathe two or three hours after a meal, and in the forenoon if possible.

6. The signs which forbid open-air bathing altogether are, chilliness and shivering after entering the water, numbness of hands and feet, and deficient circulation generally.

7. When the body is warm, bathing may be indulged in, provided undressing is quickly accomplished, and the body is not chilled before entering the water.

8. On leaving the water, dry and dress *quickly*. Standing about undressed after leaving the water is, under any circumstances, injurious.

9. Rather cut short than prolong the bathe. Swimmers

possess the power of remaining in the water for a considerable time in consequence of their active movements. But even in their case injury is often wrought by unduly extending the exercise. The slightest feeling of chilliness should be taken as a sign to leave the water at once.

10. Lastly, we may repeat the wholesome advice, that those who experience any disagreeable symptoms after bathing—such as palpitation, giddiness, etc.—should not again enter the water without consulting a doctor.

In comment on rule 4, I may say that many persons in fairly good health suffer if they go out before taking food; and these will find that they will derive more benefit from their bathe if they take a biscuit or two with a small glass of warm milk and water, or a beaten-up egg with a teaspoonful of brandy in it, before going out. Such very light refreshment is not sufficient to be injurious if the bathe is taken shortly after it, more especially as a little walk intervenes.

After leaving the water and rapidly drying oneself, the whole body should be rubbed till it glows with a flesh-brush or rough Turkish towel; and immediately after leaving the machine one should go for a brisk walk to keep the circulation up. Colds are very frequently caught by those who sit down to rest as soon as they have finished dressing. The run home to breakfast is generally sufficient. Most ladies, however, will, I think, find it best to breakfast at the sea-side at eight or half-past eight, and, especially if they have children with them, to bathe at about eleven, when the sun has had time to well warm the water. Then, if one feels hungry after the walk, which I insist upon as an essential part of the morning operations, a light lunch may be indulged in, such as a glass of warm milk with a few biscuits, or a dish of curds-and-whey with a sponge-cake. Children ought to be hungry, and to have something to eat soon after bathing.

Bathing-dresses, towels, or other toilet requisites, which are public property, should not be used, as by the indiscriminate use of such things diseases are very frequently spread.

Heed not the beguilements of the bathing-women, who will emphatically assure you that the things have been well washed; but take your own things with you, and also be sure to take them away with you, for if left in charge of the machine proprietor they are very likely to be lent to some one else when you are safely out of sight. In order to avoid soiling your clothes with the wet gown and towels, have them well wrung out, and put them in a waterproof bag to carry; when you get home have them spread out on a towel-horse in the air and sun, to dry for use on the next day. Some ladies find it too fatiguing to take a sea-bath every day, but find that one every other day is beneficial to them. If possible, it is well to charter your own bathing-machine for the season, and keep the key of it, so that there shall be no interlopers. If there is a large family, or if you can arrange to take turns with friends, and divide the expense of hiring a machine, this is a very good plan; but many people prefer to take their own tents and pitch them in some unfrequented part of the shore.

In the latter case, however, one of the party should go out in a boat so as to be able to assist any bather who may be in danger of drowning; but, for my own part, I think it far safer to bathe in frequented spots, where there are boats and plenty of people about in case of emergency.

After bathing, the face should be washed and the hair rinsed through with fresh soft water, as the brine of the sea is bad for complexion and hair. I strongly disapprove, however, of the plan of wearing bathing-caps to keep the salt water from the hair, as one of the first principles of bathing is to wet the head, and a cap keeps the head unhealthily hot. At Trouville and other Continental watering-places a foot-bath full of hot water is placed in the bathing cabinet for use when one comes in from the sea. This is a very excellent plan, not only to cleanse away the sand from between one's toes, but also to give the circulation a healthy flow. The warmth, by dilating the blood-vessels of the feet, draws the blood away

from the upper part of the body and head, thus preventing headache and flushing of the face.

In choosing a bathing-dress all bright colours should be avoided, as these are very apt to come off on the skin, and the dyes frequently contain poisonous ingredients. Those scarlet materials which are often so fashionable are especially to be tabooed, as they are dyed with aniline dyes, and are very poisonous. There is not much to say against the orthodox blue serge, which is dyed with indigo, a harmless dye; but for my own part I prefer white serge or flannel, or a stout gingham striped white and gray or blue. It is noticeable that at many ladies' swimming baths they will only allow bathing-dresses of the latter kind, as they say the dark ones discolour the water. From this I make the deduction that if they will discolour the water they will discolour the skin, and consequently had better be avoided. With regard to the form of the bathing-dress, I am delighted to find that the old-fashioned gown, which was so heavy, inconvenient, and really indelicate, has become a thing of the past. It has been dying hard for a long time, it is true; but its survival for so long has been a striking instance of the survival of the unfit, and of the extreme conservatism of women in all matters relating to dress.

Of course, with the old-fashioned gown, which resembled a long sack open at the bottom, swimming was impossible, and hence the adoption by women of late years of a proper swimming dress made with drawers. A short skirt, something like that of the Bloomer costume, has been used with women's swimming dresses as a sop to the Cerberus of prejudice; but such a ridiculous thing should on no account be worn, as it gets inflated or weighted with absorbed moisture, and is of no possible service. The best bathing-dress is a simple combination garment reaching just below the knee and without sleeves.

While talking of bathing-dresses I would urge that common decency dictates the adoption by men of proper swimming costumes similar to those used in swimming competitions.

The sight of men naked except for little wisp-like bathing-drawers is neither a pretty nor an edifying one for children, girls, and young women who frequent the beach ; and it seems strange that Mrs. Grundy, who so long fought against divided bathing-dresses for women on the score of indelicacy, should permit such an outrage against propriety. It is not indeed a pleasant thing for ladies of any age to come across male friends bathing in a state so closely resembling "pure nature." I am glad to note that at Cromer and Felixstow during the last year or two the Continental fashion of allowing ladies and gentlemen to bathe together has been adopted, and the gentlemen have appeared in proper costumes. This is much pleasanter for all, as husbands and fathers can assist their families to swim.

On removing the bathing-dress after leaving the water it is a good plan to envelop oneself immediately in a nice large Turkish towelling bath-wrap, as this prevents loss of heat by radiation from the skin. The body can be nearly dried in this ; but, as I have said, before dressing it should be well rubbed all over with a hard, rough towel, to keep it in a glow.

Learning to Swim

Swimming is one of the most delightful as well as one of the most useful of all physical exercises. It develops all the muscles, gives the circulation a healthy tone, widens the chest, and strengthens the lungs ; and owing to the way in which the movements of swimming develop and strengthen the muscles of the back, and especially of the lumbar regions, is especially serviceable to women, who are very apt to suffer with backache arising from various causes, but most frequently from tight-lacing.

Swimming should, I consider, form a part of school education and of the early training of all boys and girls, except such as are too seriously diseased to bear the excitement and exertion ; for even delicate children, if carefully taught and

guarded against shock, derive great benefit from the practice of swimming. A friend of mine has more than once laughingly expressed the opinion to me that if you take a sufficiently small baby and throw it into a sufficiently large bath of water, after struggling a little it will begin to swim instinctively; but I cannot say that this is an experiment which I should like to try; and although I agree with him that children should begin to swim young, I should put five years old as the minimum age, and I think teaching is necessary, although it is quite true that young children learn quicker than adults. I have seen a child of seven able to swim without assistance after four lessons. Adults, however, should not be discouraged if they learn more slowly, and it is not too late to begin at any age under fifty. I was eighteen myself when I began, yet after four lessons I was able to swim across the bath in which I learned, a distance of about thirty feet, without assistance. I do not at all believe in the rather common practice of making the beginner plunge, or of throwing him into the water, as the shock is apt to produce a state of nervousness which it is difficult to conquer, and to render the pupil for a time quite incapable of obeying orders. It is far better to walk in quickly and lose one's feet only when feeling the support of the rope or belt by which the teacher holds his pupil. The plan adopted by the teacher of whom I learnt was, I think, a very good one: she walked along a plank fastened across the bath, and held in her hand a long stick or wand at the end of which was a belt with armlets, which was passed round the pupil under the arms. The movements of swimming were taught while support was given by this means; but as the pupil became more at home in the water, the amount of support was gradually lessened, until at last, without knowing it, she was swimming by herself, and complete proficiency soon followed.

Delicate women are often wisely recommended by their physicians to learn swimming as a means of improving their health, and though in such cases even a little practice is at

first found fatiguing, the amount may be gradually increased, and by perseverance and determination they may become proficient swimmers; for it is by no means the naturally robust and strong who become the most rapid and graceful swimmers. Danger, however, is very apt to arise from those who swim well for a short distance, venturing so far that their strength is exhausted; and it is therefore important to learn how to rest in deep water when fatigued, or, unless assistance is at hand, presence of mind and probably life also will be lost.

Various ways of resting as well as of swimming should invariably be learnt, so as to prevent accidents in case of fatigue or cramp. Before venturing into deep water we should learn to swim with the arms or legs only, and with one hand or foot alone, so as to be well prepared for emergency in case of cramp, when the chief thing is to keep calm until land can be reached or assistance comes. The greatest danger in case of cramp is the unfortunately instinctive gesture practised by terrified people of throwing up the arms over the head—the recognised gesture of despair—which causes the person to sink at once. Cramp spasms may arise from various causes, such, for instance, as bathing after a full meal or when heated,—even in the most expert swimmers: the seizure is generally in the lower extremities. After landing a vigorous rubbing of the cramped muscles will restore the circulation and make things all right again. When a person goes down "like a stone" in the water, the cause is generally not cramp but apoplexy, failure of the heart, or suffocation from spasm of the glottis, or the entrance of water into the breathing apparatus. Sometimes in falling or diving from a height unconsciousness may be produced by the shock of the water, or of striking against some hard substance, or the bottom. Before diving one should always make sure that the water is of sufficient depth. I have known severe injury to the head caused by striking the bottom, the bather being near-sighted and mistaking the depth.

In case of accidents through bathing, or the overturning of pleasure boats, of which there are a terribly large number, every one should know

What to do in Emergencies

as many a life is lost through the ignorance and want of presence of mind of spectators; and the possibility of a chance of some day saving a life is worth a little trouble in learning what to do. If a person is observed to sink, the first necessity is to seize him or her and keep the head above water until assistance comes or land is reached. The best plan is to seize the bathing-dress, some part of the back clothing, or the hair, and above all, the rescuer must prevent the drowning person from clinging to him or her, and dragging the would-be preserver to a certain death. Such a grasp must be shaken off at all risks. In drowning, death may occur in one minute, and usually takes places after from four to five minutes of immersion; but life has been restored after the person has been in the water for eight minutes, and, in the longest well-authenticated case, after fourteen minutes. Efforts at recovery should then be made even after a prolonged immersion, and should be continued during at least three hours, even if no sign of life is given; for an instance of a successful result after as long as five hours' persevering treatment has been recorded by the Royal Humane Society. The first thing to do is to place the body on the face with one arm under the forehead, so as to dislodge the water from the mouth and throat. Then lay it on its back, remove all clothing and pressure from about the throat and chest, wipe the mouth and nostrils, open the mouth, pull forward the tongue and fix it forward by means of an india-rubber band or anything convenient that may be at hand. The body should lie on a flat surface, with the head and shoulders slightly raised by means of a small cushion or folded garment put under the shoulder blades. The most important thing is to re-establish respiration, and before this is done there must be no attempt at

restoring heat. Artificial respiration may be practised by turning the body on its side to cause inspiration, and on its face to cause expiration, repeating this action steadily about fifteen times in the minute. Or perhaps a better plan is for the operator to stand behind the patient's head, grasp the arms just below the elbows, and draw them upwards steadily until they meet above the head; after two seconds they are to be pressed gently back again against the sides of the chest, and a little pressure exerted by a bystander on the breastbone at the same time will assist expiration. These movements should be repeated from fifteen to eighteen times in the minute, and if the blueness of the body becomes less there is every reason to hope for success. These movements should be kept up until the patient breathes regularly and sufficiently by his own efforts, and should be resumed afterwards if there is any sign of a relapse. Directly the patient begins to breathe the body should be wrapped in dry blankets, and the limbs energetically rubbed in an upward direction to restore circulation. The patient should then be carried to the nearest house and put in a warm bath, which has previously been prepared, for five or six minutes, or failing that, hot bricks, hot-water bottles, or hot flannels, should be applied to the pit of the stomach, armpits, and soles of the feet. Smelling salts should be applied to the nostrils, and cold water dashed against the chest and face to promote stronger breathing. Respiration and circulation being so far restored, the patient should be put to bed between hot blankets; small quantities of brandy, wine, or coffee should be administered, and the tendency to sleep encouraged. A mustard plaister between the shoulders and another on the chest will relieve the distressed breathing which is a natural sequence, and tend to lessen the danger of bronchitis or pneumonia.

CHAPTER XIII

EXERCISE AND RECREATION

The sedentary occupations of modern life, which begin from the earliest days of schooling and continue throughout the existence of the majority of dwellers in towns, have brought about conditions of debility and ill-health which have aroused the anxiety of sanitarians, and led to the tardy appreciation of the fact that exercise, and especially out-door exercise, is an essential to physical well-being. In the life of our great public schools this principle has always been, to some extent, appreciated; and boys have had their games of cricket, hare-and-hounds, football, and other out-door sports, as forming a regular part of their daily life.

In girls' schools, however, the necessity for exercise has until lately never been thoroughly brought home to parents or teachers, and a daily sedate walk has been considered sufficient to maintain the health of the mothers of the next generation. Want of exercise, however, injures the whole constitution, the muscles waste, the circulation is torpid, the action of the lungs is slow, and the aëration of the blood consequently impaired; the liver becomes sluggish, and constipation, with other digestive troubles, follows in the track of the general weakness of the organs which takes place; the lungs are not sufficiently expanded, because the breathing is slow, and if in young children the chest does not expand properly, the bones grow in length but not in

thickness, and bow-legs or knock-knees may follow, while curvature of the spine, or what is popularly known as growing-out of the shoulder, is the frequent result.

Owing to the deficiency of the circulation the complexion becomes pale and worn, the breath bad, the general nutrition of the body is impaired by want of appetite, and bad digestion, headaches, and nervous troubles follow, while the heart and blood-vessels become weak and flabby. Now, if we take an individual suffering from debility of this kind, caused by want of muscular action, and suddenly put any strain upon him or her, such as is entailed in a walking tour, running game, or violent gymnastics, the consequence is frequently a sudden illness.

When rowing is engaged in at long intervals the heart may become dilated, owing to want of power in its walls; and sudden death from failure of the heart has frequently been known to take place on running for a train, or attempting some feat of strength in the gymnasium.

Young children, as a general rule, if they are in good health, need no actual encouragement to exercise, as their instincts cause them to run, jump, and play; and it is only by the process of restriction and limitation practised by nurses and teachers that the natural instinct for exercise is quelled. Children should be allowed to indulge in games, especially in the open air, and it is far better that they should play in their own way than that they should constantly have grown-up people dancing attendance upon them, and indicating to them what they should do, when Nature frequently leads them in another direction. At school frequent intervals should be allowed for play, preferably in the open air, or in wet weather in a large, unfurnished, and well-ventilated room; and for children up to the age of twelve years, lessons should not exceed three-quarters of an hour in duration, with an interval of a quarter of an hour between, which should be spent in play.

Kindergarten games and other gymnastic exercises are of

course better than *no* kind of muscular exercise, but games, such as games with balls, *la crosse*, tennis, hare-and-hounds, and the like, owing to the mere excitement of them, give a healthy stimulus to the brain which is always more or less wanting in set gymnastics.

The spirit of emulation should never be artificially induced by prizes or otherwise, to stimulate children either in games or other physical exercises. Urged by emulation the boy may endeavour to win a race, or lift a heavier weight than he should, or a girl overdo herself with running or climbing, when the natural sense of fatigue or strain points out that enough has been done. Holding the breath during severe strains, as in lifting weights and the like, is also injurious, as the air in the chest is compressed and the walls of the lungs endure a great strain. Sometimes, owing to great exertion, the elastic tissue of the lung stretches and the lungs become permanently distended. Neither girls nor boys should be allowed to indulge in prolonged trials of strength, unless under the eye of a careful teacher.

The effect of sunlight as a revivifying and purifying agent to the system should never be disregarded; and wherever it is possible, all exercise should take place in the open air. It would be an excellent plan if a playground were attached to girls' schools just as to boys' schools. There is, however, frequently wanting in mothers a sufficient sense of the importance of this matter as regards their daughters' health. They do not mind paying heavy playground fees for the boys, but consider such expense unnecessary in the case of the girls. This, however, is not as it should be; for it is quite as much, if not more necessary, to build up the growing constitution of the girl, as it is to develop that of the boy, since, owing to the repression to which women have been subject for centuries, the natural instincts towards exercise are not so developed in them as in boys, so that in many cases they even need to be led into playing. At one of the large London schools, the experiment of starting a playground

for girls was tried, and it was found that the little girls stood about in groups and did not make much attempt to play together until stimulated by the example of their elders. Again, when they were taught cricket they did not show that *esprit de corps* which is so developed in schoolboys, but seemed rather inclined to become sulky if kept at fielding for long periods. Their mothers also seemed to indicate that they did not think it would do the little girls much good if they did not get any innings, neglectful of the importance of the moral training exercised by all games in which the individual has to submit to the good of the majority.

Walking.—In watching a large number of people pass to and fro it can hardly fail to strike the observer how few people really seem to know how to walk. They shuffle, or waggle, or scurry, or lurch, or slouch along, the chief idea appearing to be to get over the ground somehow or other, but with no kind of regard as to how it is done. The erect position should be maintained and enjoined on children from the earliest age, for when the body is held upright and the lungs fully expanded, all the organs have room for fuller play, the blood is better aërated, and fatigue is lessened, so that if one walks erect it is actually possible to walk quicker and with less fatigue than if one walks in a careless, lounging way. The erect position, with expanded chest, is also the best preventive of consumption.

Infants should not be allowed to walk until they make voluntary efforts to do so, as when the muscles are strong enough Nature prompts them to imitate the movements they see in others; but after natural walking and running about have been practised during the first few years of life, and sedentary occupations begin to take the place of the active life of the young child, it is desirable that children should be taught to practise graceful walking, and dancing lessons may be given from the fifth or sixth year of age with great advantage. Children who learn to walk with grace and dignity while they are very young will retain a

good carriage in later years, while their whole systems will benefit from this.

For boys and girls at school, drilling is valuable as ensuring a more upright carriage; and in order to walk well, of course the feet must be comfortably clothed according to the principles I have indicted in Chapter X.

It is calculated that to walk a mile is equivalent to raising 17·67 tons one foot high, so that the expenditure of energy in walking is very great. It is calculated that the expenditure of 300 foot tons of energy is an average day's work for a strong, healthy man weighing about 11 stone. At this rate he would have to walk 17 miles if he did no other work, and supposing he were to wear no clothes. But if he had to carry even a small addition of weight,—say, of his clothes and a parcel, in all 12 lbs.—he would expend an extra $1\frac{2}{3}$ foot tons of energy for every mile, so it is important that in walking expeditions the weight of clothing should be reduced to a minimum.

The effect of walking, especially if the arms are swung, is to exercise most of the muscles in the body, to raise the temperature, to quicken the breathing and the pulse, increase the action of the skin, improve digestion, and make the person hungry. By the increased hardness of the muscles, the circulation of the blood through them is hastened, and the excretion of water, carbonic acid, and urea is stimulated, while an increase of oxygen is taken into the blood.

When pleasing conversation takes place the benefit of a walk becomes still greater, and the action of breathing is stimulated, while the blood circulates more freely in the brain. The monotony of the two-and-two daily processions of schoolgirls which take place slowly is sufficient to seriously lessen the benefit obtained by the out-door exercise; and whenever there is a possibility of giving the girls a run, or letting them walk rapidly, or go to some country place where they can search for flowers and the like, the opportunity should be taken.

When girls leave school, especially if they have no lively companions, they are inclined to sit about the house reading novels, and circumstances frequently prevent their going out by themselves. Especially in the country, where the roads are rather lonely, girls stay very much in the house; and in these cases where anæmia has frequently supervened, I have found that by advising the parents to buy a large dog for the girl, much good was done, as the dog was a protection against tramps, and also stimulated the girl to run out of doors in order to keep pace with his frolics.

In London and other large towns the cheap rates of public conveyances also tend to discourage walking, and it would be a good plan if young girls were to make associations among themselves to go on walking expeditions, thus getting regular exercise, but never taking walks of excessive length: from 7 to 9 miles being the outside distance that a woman should walk in one day. Many girls who go for country holidays with their brothers, and take long, unaccustomed walks, lay themselves up for months to come by this means.

In large towns if playgrounds were attached to schools, they might be hired for certain afternoons in the week by girls who have left school in order to practise sports; and during the summer months such games might with advantage be made a matter of routine.

Both men and women who are constantly occupied in business during the day should be careful to take regular outdoor exercise. Say the hours of work are from about nine in the morning till six o'clock in the afternoon, the following routine would enable a fair amount of exercise to be taken. Rise at seven, sponge over with cold water, or take a bath, rub the skin well for ten minutes. Take breakfast at 7.45, and at half-past eight start for a walk, reaching the office at nine. Walk moderately at first, and then increase gradually to a fairly quick pace, say at the rate of about $3\frac{1}{2}$ miles per hour. Walk the same distance home in the afternoon as in the morning, and rest until dinner-time. On fine nights

another walk may be taken before going to bed, which should be not later than eleven.

Swimming is an excellent exercise for both sexes, and tends to develop all the muscles of the body. (See Chap. XII.)

Riding is also a healthy exercise for both sexes; but in growing girls it is important that they should not always sit on the same side of the horse, but should have saddles, the pommels of which are reversible, so that they can sit sometimes on the left side of the horse and sometimes on the right, as sitting always upon one side may tend to deformity. In order to prevent displacement, a good abdominal belt should be worn. Women who have any tendency to womb disease should not ride.

Riding is an especially healthy exercise for men from 35 to 65 years of age, and is the most suitable of all exercises except walking.

Driving is little exercise, but owing to the change of scene and fresh air which it ensures, is particularly valuable for those in very delicate health.

Cycling is equally suitable for both men and women, as it exercises the muscles and stimulates all the functions of the body, while the variety of scene that may be enjoyed by means of a cycle acts as a healthy and pleasant stimulus to the mind. It is a great mistake for beginners to cycle for too long at a time, and they should never go on till they are over-fatigued, moderation in this, as in other matters, being most important. Girls who cycle should be dressed in woollen combinations, a woollen bodice on to which knickerbockers are buttoned, plain close-fitting skirt of tweed or cloth, and a Norfolk or other jacket, with hat to match. The knickerbockers should be made of the same material as the costume. Woollen stockings and broad shoes should be worn, and it is a good plan to have the costume waterproofed by a process which will render it rain, but not air-proof. Racing on cycles should never be practised by women.

Running.—The difference between walking and running

is that in the former one foot is always on the ground, while in the latter the body is thrown forward by a series of springs upwards, so that both feet are off the ground at the same time. An increased number of steps are taken in a certain time. Persons who are tall naturally take a longer stride than those who are short, and it is not a good plan, therefore, for short and tall persons either to walk or run much together, as each interferes with the rate of progression of the other.

Running may be indulged in with impunity and advantage by boys and girls up to the age of about ten, if they are not allowed to become breathless and fatigued, and again between the ages of twenty and thirty it may often be practised with advantage. But about the age of puberty, running, and especially training for running, is highly injurious, and tends to impair the growth of the body and the general health; while after thirty the heart and blood-vessels begin to show signs of wear and tear, and running, except at a very moderate pace, should not be indulged in. After the age of forty-five running should never be practised at all, owing to the tendency to degeneration in the walls of the heart and blood-vessels, and, as I have said, running to catch a train is a frequent cause of death from apoplexy, or the bursting of a small blood-vessel in the brain.

In running, the upper part of the body and head are to be thrown back, the chest being well forward, the elbows bent and the fists held close to the front of the shoulders, the object of this position being to take the weight off the chest and to allow freer play to the lungs. Breathing should be practised regularly and freely, commencing with deep and free breathing from the first, and a runner should never wait to inspire until he becomes breathless.

Jumping is best practised from the age of eighteen or nineteen until the twenty-fifth year. The force expended in jumping 1 foot is equivalent to a force capable of raising 154 lbs., taking this as the average weight, 1 foot from the ground. Thus a jump of 2 feet high is equal to the expendi-

ture of a force of 308 lbs.; that of 6 feet 2½ inches, which is the highest jump on record, is equivalent to the sudden raising of 956 lbs. The muscles chiefly exercised are a few of those in the calf of the leg and front of the thigh, so that jumping is not in itself a particularly efficient exercise, and it is attended with certain dangers, which lessen its value, such as the strain of a joint, especially the ankle, the fracture of the small outside bone of the leg, rupture or hernia, and breaking of the knee-cap, which is a very serious accident. It has sometimes happened that when one knee-cap is broken, being caught by the sudden contraction of the muscles, which snap it across the end of the thigh bone as a stick is broken across the leg, the other knee-cap is broken in the attempt to prevent falling; and the person to whom the accident happens becomes almost a cripple for life.

Skating is a great boon to women as well as to men, and does much good to the circulation, respiration, and digestion. It also improves the mental condition by the novelty of this method of progression. Outer wraps must be laid aside when skating is begun, and put on again when it is finished. Ankle boots with strong uppers must be worn, and those who have weak ankles must wear skates with ankle straps and buckles.

Rowing is a healthy and pleasant exercise during the summer months; but in the late summer and autumn there is danger to be apprehended from the evening dew and damp, if one resides near the river. Entirely woollen clothing must be worn during rowing, and there must be a wrap to put on after stopping the exercise. Beginners should guard against holding the breath at each stroke, as it is uncomfortable and also dangerous, since it may cause hernia, dilatation of the cavities of the heart, rupture of the valves of the heart, or varicose veins. In the middle-aged it has also been known to give rise to apoplexy or aneurism. The breath should be allowed to escape while the oar is in the water. Racing should never be indulged in except by those accustomed to

rowing. The exercise should be stopped immediately fatigue begins, and a slow stroke of not more than twenty-four to the minute should be practised. It is not wise to row immediately after a meal; and when resting for luncheon or tea, an extra wrap should be put on while the motion is discontinued. Clothing should be changed immediately on going home, and a warm bath of the temperature of 92° should be taken before going to bed, as this obviates muscular stiffness. To avoid blistering of the hands, they should be well powdered with oxide of zinc powder before starting, and the handle of the oar, which should be smooth, should be kept dry.

Rowing a mile at racing speed is equivalent to 18·56 foot tons of force expenditure, and is therefore one foot ton more expenditure than in walking a mile.

Cricket is the chief of our national sports, and develops a spirit of honour and self-reliance and *esprit de corps* in its players. Boys and girls playing with those of about their own size are comparatively free from danger, but in middle-age, when the body is encumbered with fat, it is not wise to suddenly start to play cricket.

When cricket is practised by women, thick pads should be worn over the breasts in order to protect them from possible accidents by means of the hard balls.

Tennis is a very suitable game for women, but care should be taken to exercise the left arm as well as the right, as playing only with the right arm tends to develop the muscles of that limb out of proportion to the other side.

Football has great attractions for many, and probably its chief attraction is due to the fact that it is rough, and exercises the fighting instinct which is implanted in most boys. It is, however, a very dangerous game, and I am opposed to its adoption for girls, which has been advocated by some who are interested in outdoor exercise, while I consider it calculated to foster evil instincts in boys.

Dancing is a very healthy exercise for winter weather, if the unhealthy surroundings in which it generally takes place

are modified. Rooms for dancing should be better ventilated than now happens; but it is the hostess's duty to see that there are no actual draughts, especially on staircases and in conservatories, so that colds may be avoided. A good waltz is often the only exercise in which a fashionable woman indulges; and the dancing class is a decided advantage in fashionable schools.

Gymnastics and *Calisthenics* are coming more and more to the front in our system of education, and they certainly have a useful part to play, but they should never be allowed to supersede outdoor exercises and games, as the mental stimulus is by no means so great.

The Swedish system, perfected by Ling, is perhaps the most valuable of all systems, as it has been worked out from a scientific basis. It is now practised in many English schools, and even in Board Schools, and due attention is paid to the development of all the muscles of the body, while breathing exercises form part of the routine.

All gymnastic exercises should be such as tend to develop the lungs and facilitate breathing. Ball exercise, commonly adopted in schools, such as dapping a ball on the ground, which occasions a stooping position, and exercises which bring the arms to the front, as with dumb-bells, will sometimes compress the chest, and should be discountenanced. These do not form a part of the Swedish system, but are generally practised in the English system. High jumps, climbing ropes, giant strides, trapeze exercises, and other violent exercises, which lead to straining of any of the organs, should be discountenanced, especially for girls; and, as a general rule, exercises done without machinery are preferable to those in which an elaborate system of ladders, trapezes, and the like, plays a part.

The kindergarten singing games for children are mostly very good, as the exercise of singing while the body is in motion assists the action of the lungs.

Whenever it is possible, gymnastic exercise, drilling, or kindergarten games, should take place in the open air.

CHAPTER XIV

REST

Work, and hard work too, is the ruling spirit of this *fin de siècle*. We live at a breakneck speed; and from the day labourer breaking stones on the high-road, to the Royal Prince racing about from function to function, with hardly ever a moment to call his own, we all hurry along alike in the race for bread, for wealth, or for social advancement. We do not live in a philosophic age, which gives time to reflect as we wend our way, but we are all rushing on after what to most proves but a will-o-the-wisp; for when wealth or distinction is attained it is but too often paid for dearly by early death, or such ill-health as to render its enjoyment impossible.

From the point of view of hygiene, therefore, it becomes a matter of paramount importance to discover how best to regulate our lives so as to obtain the maximum of work with the minimum injury to health; and the chief rules to which to conform in order to gain this object regard: (1) Sleep, (2) Digestion, (3) Change of Occupation, (4) Holidays.

1. *Sleep*

Sufficient sleep to restore the exhausted system is above all necessary, but the amount required varies in different individuals. As a general rule eight hours sleep is sufficient, although many can do with less, and a few are absolutely in

need of more. When sleep is disturbed during the night an afternoon nap is very advisable; and, although to many, it may appear waste of time, the increased vitality and capacity for work which follow it quite compensate for any apparent loss. I can imagine a business man laughing when he reads this, and wondering what a client or customer would think if he came in and caught him at his "forty winks"; but although to many such a luxury would be impossible, a very large number of men and women would be able to enjoy it if they would make up their minds to set aside certain matters of trivial importance, such as an afternoon call or shopping expedition, and devote the time thus gained to restoring their exhausted vitality. After child-birth, and during convalescence from disease, a short sleep during the day is often the means of hastening a perfect recovery.

2. *Digestion*

Hurry as affecting digestion is one of the greatest mistakes of modern so-called "civilisation." It is impossible to be well unless a proper time is allowed for each meal, so that if solid food is to be taken it should be masticated thoroughly, and time given for the stomach to perform its functions, by means of an efficient blood-supply. If by mental or physical work immediately after eating the blood is drawn away from the digestive organs, these cannot do their duty; and although immediate injury may not be felt, a store of misery is laid up for the future. Professional and business men, who are obliged to be on the move in the middle of the day, should take their chief meal in the evening; and by way of luncheon take a little milk mixed with lime water, a small bottle of which may be carried in the pocket, and a dry biscuit, or a cup of Bovril, with stale bread, or even Bovril lozenges, or Frame Food tablets, or unsweetened chocolate, which may be sucked as they go about their business. These things supply a certain amount of nutriment without entailing much labour on the digestive organs.

3. *Change of Occupation*

Even during working days change of occupation is often possible, and when possible it should always be taken, for by exercising one part of the brain or body excessively that part becomes exhausted; whereas, if we change from mental to physical work, or *vice versâ*, restorative action takes place in the nerves and muscles previously used. It has been proved by experience in our board-schools that children who are only engaged during half their working time in lessons, and the other half in manual or outdoor occupations, make better progress than those whose whole time is devoted to study; and as with the child so with the man. He who has a hobby is very apt to make better progress in his business or profession than he who keeps his nose to the grindstone all day long. What I have just said applies to business women as well as to business men.

Men are rather apt to underrate the everyday work performed by the ordinary wife and mother. To make her home and husband happy, and bring up her children in the best possible way, are the good wife's chief aims in life; but even the most conscientious woman may fail in the fulfilment of those high aims owing to want of necessary knowledge, to want of order in her arrangements, to faults of disposition which may be by no means beyond remedy, or even to over-anxiety on her own part.

The great secret of a happy home is to be found in the disposition of its mistress. If the "housemother," as the Germans call her, is worried, over-anxious, and irritable, the children become dull, depressed, and also irritable; the husband grows discontented, and either adds to the general worry or seeks his pleasures out of doors, thereby increasing his wife's troubles; and the servants, ceasing to be under proper control, and getting only cross looks and words of annoyance for their pains, soon wax insubordinate. A bad temper in the mistress of a house is a true curse to all about

her; but, just as the majority of diseases are preventable if due care and knowledge are displayed in the management of health, so bad temper and fretfulness are in the vast majority of cases quite preventable. Fretfulness and irritability are as much symptoms of disease as the headache, or neuralgia, which they so frequently accompany; and, as a rule, their causes are overwork, want of change, indigestion, and insufficient nutrition, anxiety, disturbed sleep, bad air, or any or all of these unhealthy conditions combined. Many women look upon devotion to their households, constant self-sacrifice in little things, and neglect of their own persons, both externally and internally, as heroic, and glory in sufferings endured, as they think, for the benefit of their husbands and families; but no greater mistake could be made than to think any one derives advantage from their self-imposed injuries. Self-preservation is not only the first law of Nature, but it is also the first law of Ethics, and, unless in exceptional cases,—as, for instance, when an invalid has to be nursed day and night, and there is positively no one to assist in the work,—one's first duty is to take care of self, since only by doing so is it possible to preserve one's usefulness.

To begin with the question of overwork.

I once read in an American paper some verses which were intended to be comic, but the meaning of which, to my mind, was sad enough. They began with the lines—

> There was an old woman who always was tired,
> She lived in a house where no servant was hired.

I forget exactly how they went on, but they told the daily work of this old woman, from getting up before daylight to kindle the fires, to scrubbing the floors, washing the dishes, cooking the meals, mending the clothes, and doing the thousand-and-one other things which constitute the necessary household labours. At last, utterly worn out, she found herself on her deathbed, and addressed her relations and friends in a self-congratulatory way in these words—

> Don't grieve for me now, and don't grieve for me never,
> I'm going to do nothing for ever and ever!

Doubtless many a weary housekeeper shares this view of Paradise, and, in the hurry and worry of the present, earnestly longs for a time when she may be able to "do nothing for ever and ever"; for there are, unfortunately, a very large number of women who have the misfortune to be always tired. Whether or not the establishment can boast one or more servants, if the house is large, and the money not plentiful, the "housemother" will always have her hands full. Early in the morning baby wakes her up, and he must be comforted and soothed before he can be washed and dressed, an operation which no good mother would like to leave to a servant. Then she must make her own toilet, and be ready and smart and cheerful to look after the breakfast for her husband, who is in a hurry to be off to business, and will grumble if it is a minute late. Hardly a word is to be got out of him, for he is bent on devouring his newspaper with his coffee, and woe betide if a cry from the baby, or a noise made by the other children, disturbs him at this occupation. Well, he has gone out, and now the elder children have to be given their breakfasts, their books packed up in straps, a final touch put to their toilets, and they are sent off to school. Then she must see that the rooms are put in order, and perhaps help make the beds, or, if it is Monday, look out the wash. By the time these things are done, preparations for the children's dinner have to be made; and when that is over and cleared away there is plenty of sewing to do to occupy her till their tea-time, the baby, of course, claiming much attention in the meanwhile, and the next youngest clamouring to be amused. After the children's tea baby is put to bed, and then the husband's evening meal must be got ready, and the best smile that can be summoned up to the tired face put on to receive him. Thus she toils on every day from year to year, mending the children's clothes, washing and dressing them, sometimes teaching them, ordering and

often preparing their meals; seeing that the house is kept clean, brushing Lizzie's hair, plastering Jack's face, damaged in a schoolboy fight, scolding Tom for slapping Mary, rebuking Jim for putting out the eyes of Bessie's doll, and nursing all of them through the measles and other diseases incident to child-life. No change from day to day, but perhaps a change of worries; no time for amusement, none to read a book, or keep up the accomplishments, such as drawing, singing, or playing on some favourite instrument, which formed so large a part of the occupations of life before marriage. Such is the true but monotonous picture of the life of too many "housemothers." Many a woman, like Dan's wife in the poem of that name, is worn out by the labours and cares which, though unnoticed by those about her—"everyday work," "commonplace duties," as they are called—none the less sap her vitality, shut pleasures out of her life, reduce her to a state of constant, uncomplaining despondency, impair her intelligence, and make her prematurely old.

A husband who sees his wife looking jaded and worn, and almost too tired to talk on his return home, wonders "What on earth she can have to make her look so fagged out"—for men are but poor judges of women's work, which is in reality very often far more wearing and fatiguing than their own. A man would grumble if he had to carry about a parcel weighing 20 lbs. or so during a great part of the day, but a woman gladly bears the burden in nursing a 20-lb. baby. Men are too apt to think slightingly of household work; to exclaim that they "can't imagine what women have to worry them, and always be so busy about, for women have really nothing to do." But they would think differently if they attempted to do the work of a "housemother" in a large family of small children, even for a day; it would be well if they would try it for once, as then they would have more sympathy with that overworked individual, and not feel so aggrieved if she looks dull, or is a trifle irritable when

the lord and master returns and wants his share of her attention.

Under circumstances such as I have described, and which are, unfortunately, exceedingly common, an angel would hardly be able to keep always cheerful, and preserve an unruffled temper. The changeless and hopeless monotony of such an existence, the hurrying over meals so as to be able to serve the others, the deprivation of fresh air and sunlight, give rise not only to indigestion with its attendant evils, or debility from want of sufficient food, but also to a general condition of nervousness, which renders every worry a thousand times harder to bear, magnifies every trifling fault on the part of children or servants into a serious matter for complaint, and every little ailment into a cause for grave alarm. This condition not rarely progresses into insanity, with suicidal tendencies; or the feeling of weakness and depression gives rise to a craving for stimulants, so that a habit of drunkenness is induced; or more commonly a habit of fretfulness is established, which darkens the home, makes the children's and servants' lives a misery to them, and drives the husband and father to seek brightness and gaiety elsewhere.

There are many such unselfish women in the world, who bring about the most disastrous consequences for themselves and those they love best, simply by means of their neglect of self; and on these it is necessary to impress the fact, that the care of self is one of the most important matters if they are to really do their duty towards others. Such a woman as she who sacrifices herself to her family, and goes down to an early grave, or becomes an inmate of a lunatic asylum through her devotion, may be a heroine, but she is not a comfortable person to live with, nor has she done her duty in the best possible way.

Often and often a woman will go labouring on at whatever she may have in hand—sewing, running up and down stairs, nursing and amusing the children, dusting and tidying, and superintending the kitchen, while aching head and limbs and

tired eyes have long ago indicated that rest was needful. Yet, heedless of these danger signals, she will continue to work at matters which in all probability can very well wait awhile, when, if she were to lie down for half an hour in quiet on her bed, and sleep if possible, she would rise again refreshed and capable, and able to complete her tasks with pleasure instead of pain. Almost every housemother, who is really conscientious in the exercise of her duties, would be better for a rest in the prostrate position in the middle of the afternoon after superintending the children's dinner. It is not sufficient to simply sit down even in an armchair, or to lie on a sofa within hail of all that is going on. Rest of all the muscles should be ensured by relaxing them thoroughly, as in lying on a bed; and rest of the brain should be obtained either by sleep, which is especially needful to those who are disturbed in the night by young babies, or by reading some light and amusing book. To write or talk during the time allotted for rest is a great mistake; and instructions should be given that she is not to be disturbed by children, servants, or visitors, unless for an important matter.

The best policy is to husband one's strength, and the feelings of muscular and mental fatigue are a certain indication, which should always be obeyed, that rest is needful. For women who are not strong, another half-hour's rest in the evening before the husband comes home is a great advantage, enabling them to be far brighter and more cheerful, and consequently more attractive and pleasing to him than would otherwise be possible.

Much of the irritability and ill-temper which is such a bar to happiness in the home is the direct product of ill-health, frequently brought on by the over-conscientious but ill-judged attention to home duties. Physical and mental recreation are absolutely necessary to the housewife if she is to carry out her duties in the best possible way; and there is a golden mean to be observed between the contemptibly lazy woman, who lets her house go to wrack and ruin, and her children run

wild, while she is always lolling on a sofa with a novel in her hand or "gadding about," and the over-anxious and conscientious housewife, whose hands are always busy, whose brain is always on the work at planning and contriving, who gives herself hardly time to swallow her meals, who rarely sits still for more than five minutes at a time, and who never leaves the house unless it is to do "the shopping." The former rusts out, and is apt to become a prey to hysteria and fancied ills; but the latter inevitably wears out before her time, and is either attacked by some serious disease, during which the rest she so much needs is enforced, and the spent strength thus eventually renewed, or becomes weaker by almost imperceptible degrees, and at last dies of pure exhaustion, without any one guessing the real cause of death. The care of her own health, then, should be one of the first considerations of every wife and mother, and of this we may be very sure, that if she does not take care of herself no one else will take care of her. Husbands rarely guess the true state of the case when their wives are over-working themselves; children can hardly be expected to notice, and servants are not in the least degree likely to do so, their stronger constitutions leading them to think that their mistresses are capable of quite as much exertion as they themselves.

The housewife, then, must know how best to take care not only of her household but also of herself. From the very first the newly-married wife must be careful not to acquire habits which will tend to impair her health, bodily or mental, in future years, when the full cares of the household come upon her. Her new home may be fascinating enough, and she may love to be always occupying herself in it, re-arranging furniture, making new things, devising tempting dishes for the husband when he comes home, and perhaps stitching away at tiny garments for which she hopes ere very long to find a use. But she must not allow inclination or the idea of duty to keep her always at home; she must take a daily walk, visit her parents, and, above all, not neglect her

old friends, or fail to make new ones. If she once begins to isolate herself from companions of her own sex she will have good cause to regret it afterwards. She should invite such neighbours as she may think suitable to take tea with her, or bring in their needlework to sit with her and chat for an hour, and return their visits in the same way. She should get friends of her own age to join her in different excursions—a few hours in the country, a visit to a museum or exhibition, a concert, a lecture, or an afternoon performance at a theatre. Thus she will get a change of ideas, and not only be more bright and cheerful when her husband comes home in the evening, but will also have something fresh to talk to him about, and be able to draw his mind off the worries of business with her merry chatter as to her day's occupations.

Considerable enjoyment may be obtained in this way at a very little cost; and a true woman can even get a great deal of pleasure out of an excursion with a friend to "look at the shops" and criticise the last new thing in bonnets. Then in the evening husband and wife should not always stay at home till conversation flags, and they are on the way to grow tired of each other's company. There are many places of amusement to which they can and should go, for a change, at very little cost; or they should "drop in" on friends where they know they will be welcome, and whom they will in their turn receive with pleasure.

Then again, while the husband is out during the day the wife must not neglect her own meals. So many young wives when alone confine their diet to tea, bread and butter, sweets, pastry, or such-like trifles, which stay the appetite but do not nourish the system, and eventually ruin the digestion. She must have a proper mid-day meal of meat, fish, eggs, or something equally substantial; and if she does not care to eat alone, as is the case with many, she can arrange with some friend to lunch alternately at each other's houses, and thus both will enjoy their meals better at no extra cost. If, however, she eats alone, she must be careful

not to fall into the habit of bolting her food, which is so easily acquired by people who have no one to talk to during meals. Lively conversation and laughter, it should be remembered, are the best digestives.

When with the advent of children the family cares increase, the household becomes larger, and the work greater, there is all the more necessity that the housewife should give attention to her own well-being. She must not fall into the error of hurrying her meals. She must have out-door exercise, however difficult it may be to spare the time. If it is only to take the elder children to school and fetch them, it is better than nothing, and instead of sending a servant to do the marketing she should do it herself. She will thus get air and some little change of scene, and will find she saves much money by buying herself what is required, as she will thus obtain a knowledge of the current prices, so as to buy in the cheapest market, and will be able to get exactly what she wants. To allow tradespeople to come for orders is a very extravagant plan, and to send the maid to buy the things is worse; for, as a rule, servants buy the dearest things, thinking it looks grand to do so, and in any dispute as to price we find they always side with the tradespeople (their own class) against their mistress.

However multifarious the duties of housekeeping, the housewife should endeavour not to give up her former friends, and to obtain as much change as possible in their society. If she is a good manager, she will be able to do this without neglecting her household duties. It is a good plan to leave all the sewing till late in the afternoon, and get a friend to sit with her while she does it, or take it into a neighbour's house to do. The sitting at work and chatting gives rest, and enables a woman to look and feel brighter when her husband comes in.

The two things which one should most gladly admit into the house are fresh air and sunshine. Sunlight in itself is not only cheering to the spirits, but is one of the best dis-

infectants and tonics in the world. A room which is shut up from the light will always be damp and musty, and it is better to fade the carpets and curtains than to keep out the sunbeams. In the arrangement of rooms, light colours are also far more cheering than dark; and, just as she should care for the neatness and attractiveness of her rooms, so should the housewife pay attention to her own personal appearance. Slovenliness in dress indicates a similar condition of the mind; and when a woman ceases (as many poor overworked housewives do cease) to take an interest in "how she looks," it is a sign that there is something very seriously amiss with her, which should elicit inquiry on the part of her husband and friends. The wife should look fresh and cheery to receive her husband when he comes home tired, and perhaps worried, with the work of the day; and, above all, the husband should not be entertained on his return home with a full, true, and particular account of all the evil-doings of the servants and the worries of the day, as is, I am afraid, very generally done. Surely a more pleasing topic can be found than the details of domestic life, which are pre-eminently the woman's business.

When the husband has had his evening meal, and the children are all in bed, is the time for amusement. No work must then be got out, unless he likes to smoke and talk while it is going on, or read aloud while it is done; but home evening occupations should always be made to alternate with visits and outdoor amusements, and even a late stroll through the gas-lit streets is often pleasant, and will lead to a sounder night's rest than if both sit at home all the evening.

The wife should endeavour to share the husband's pleasures as well as his troubles, and remember that his love may best be retained, and his life made most happy, by keeping herself well and young-looking—her face and her home bright and gay.

By far the greatest part of the happiness or unhappiness of life is made up of little things; and no home can be a

happy one in which proper attention is not given to even the smallest details of everyday life.

4. *Holidays*

The "Sabbath of rest" is one of the most beneficent ordinances, and it is chiefly so because then all ordinary avocations are set aside; but in addition to this most of us are from time to time able to take a longer holiday, and it becomes a matter of interest, and, indeed, of importance, to know how to take one's holidays so as to get the greatest possible amount of advantage from them. What the majority most want is rest, and the best rest from the worries and labours of everyday life is a thorough change. Poor, overworked school-children, students, and teachers, should throw aside their books, and wander about in the open air at their own sweet wills. The literary men and women who are haunted by the constant visits of the printer's "devil" should endeavour, as far as possible, to arrange their work so that, at any rate, for a week or two they may be freed from calls for "copy," and hardly as much as see a pen. The city clerk, accustomed to sit all day with his nose to his desk, will profit by a sojourn at the sea-side, where he can get moderately long walks and an occasional row on the "briny." Rowing, indeed, is a form of exercise to be strongly recommended for all who lead a sedentary life, and a form of exercise particularly pleasant at the holiday time of the year. Young ladies and their chaperones, worn out by the claims of society and the manifold fatigues of "the season," should seek quiet country nooks where they can go to bed at ten, rise at seven, not see a glimpse of a programme or a playbill, hear the sound of a valse, nor trouble over the lack of partners or the iniquities of the dressmaker. Hard-worked mothers of families should leave their households and their cares behind, and go on visits to friends, or on trips with their husbands only, if but for a few days. There is

no greater mistake than to take a house at the sea-side and simply transfer the family, the servants, and the anxieties thither; this may give a change to the children, even to the father, who for the previous months has been out all day about his business; but does not the mother require a change also? Where grown-up families live together throughout the year, it is also a mistake for all to take their holiday together; they want a change of ideas, they need to escape from everyday routine, and they should scatter themselves on visits to acquaintances, or take trips in company with friends, rather than relations, and seek fresh society.

The choice of a holiday resort should be made with due consideration to the climate and the constitutions of the would-be visitors; and it is a great mistake to engage a house which can rarely be rented for less than a month or six weeks, unless quite sure that the place where it is situated will agree with the whole family. Many places are specially obnoxious to certain individuals, and different constitutions are affected differently by them.

Again, the situation of houses in a town is very important. Persons who suffer from diarrhœa and debility, when at a low level, as on the sea-front at Eastbourne or Torquay, improve wonderfully in health if they live on the hills at the back of the town, where the air is fresher and more bracing; and, on the other hand, those whom the stimulation of very bracing air renders nervous and affects with headache, do better when at a low level.

When the weather is exceedingly hot and the sun very powerful, resorts should be patronised where the air is keen and bracing, and where shelter is afforded by abundant foliage or artificial resting-places on the beach. Cromer is an ideal resort during hot weather.

Places which have the reputation of being well drained should be preferred to others; and in choosing a residence, it is best to select it at the top of a hill rather than below the level of a great many other houses, since sewage naturally

descends, and the refuse of all the houses above a certain level will collect at the level, unless there are extraordinarily efficient flushing arrangements.

It is necessary to be very particular in inquiring about the water-supply. I believe a great many of the deaths from summer diarrhœa, which one always finds reported during the hot months, are caused by drinking contaminated water; and the serious epidemic of typhoid at Worthing in 1893 undoubtedly arose from that cause.

The water-supply is so often questionable, and it runs such risk of contamination before it reaches the consumer, that it is always wise to purify the water before use. To do this reliably it may be boiled for a quarter of an hour, allowed to stand in a cool place for twenty-four hours, and then be boiled again, after which it can be drunk with safety; but must not be kept over the second night, as boiled water favours the development of germs to which it was fatal when unboiled. Boiled water, however, has lost a large part of its gases and mineral salts, and is less palatable and less digestible than unboiled water, so the best plan, whenever possible, is to use a Pasteur filter, as described on p. 55. This is made in various forms, that for travelling having an arrangement which causes it to work under pressure without being connected with the water-main, so that a glass of pure water can be had in a couple of minutes, and during the night enough can be filtered for the family's consumption on the following day. The travelling Pasteur filter is in a small flat case, but if not available, it is unwise to use any other form of filter unless the water and the filtering medium are first boiled; for ordinary filters which restore some part of the flavour lost by boiling are liable themselves to become active sources of danger.

In taking either a house or apartments, especially when one has children who are also going, it is necessary to be very careful in endeavouring to discover whether there has been recently, or is still, any case of infectious disease on

the premises. Many persons, considered moral and respectable members of society, will not scruple to take a child who is recovering from an infectious disease into a house or apartments without informing the owner of the nature of the complaint; and thus many cases of apparently mysterious origin arise. Among my own friends one boy undoubtedly caught scarlet fever in this way, and another family of children took the measles. In some cases lodging-house keepers conceal the fact that they have, or have had recently, infectious disease in the house, though they are liable to prosecution in the event of discovery; but as a rule, they are imposed upon by unscrupulous lodgers.

Many people, in looking for a house or apartments at the sea-side, make the mistake of trying to "do things on the cheap"; and I have known people who live in handsome houses in some of the fine streets and squares, or overlooking the parks of London, who dwell habitually in large airy rooms and keep a professed cook, hire at the sea-side a little house in a poky, side street, where the rooms are close, ill-ventilated, uncomfortable, and not too clean, and where the cooking is simply atrocious. Such people are very much surprised if their health does not improve during a holiday; but, in point of fact, they are going from good sanitary conditions into bad ones, and they may consider themselves lucky if they do not return home feeling worse than when they left it. At a fashionable sea-side resort, a good apartment can never be hired under about two guineas per week for a front sitting-room, and a guinea for each bedroom, and in the height of the season far higher prices are charged. It is really better to remain at home, than to economise when away from it by doing without the comforts of home. When seeking a house or apartment one should be greatly guided by the sense of smell. If there is any unpleasantness, or if the air seems stuffy, refuse the place, even if it be "dirt cheap"; for, believe me, dirt is never really cheap, and often results in a heavy addition to the doctor's bill. Secure

large, airy, and sunny rooms, being particularly careful with regard to the bedrooms, which people are apt to forget are the rooms occupied more than any others. Turn down and well feel the beds to see that they are clean and properly aired, for rheumatism and rheumatic fever are too often the results of neglecting this precaution. Assure yourself that the cooking will be well done, or take your own cook; and convince yourself that your landlady will be an agreeable person to deal with, for nothing tends more to spoil a holiday than to be worried and annoyed by disagreeable attendants. Try to have as little worry as may be.

Another observation may be made on holidays, and that is that we are inclined to take them too conscientiously. A programme is made, according to which a certain number of places must be visited, of miles walked, of sights seen, of games played, of hours spent in the open air, or in rowing or riding; and the holiday-maker insists on performing this programme to the letter though he perish in the attempt. For example, lawn tennis is one of the safest and best of games for girls, but scarcely a summer passes without my seeing a number of young ladies who have made themselves ill simply by insisting on playing it every day and all day. We have abundant proof that it is possible to have "too much of a good thing," and excess in exercise is as bad as an over-sedentary life. People unaccustomed to exercise will make up their minds that a twenty-mile walk will do them good, whereas in reality they will suffer from the unusual exertion. Young men beginning their vacation with a walking tour, will often fall into illness directly traceable to a sudden strain upon the system; and girls endeavour to emulate their brothers in long walks with disastrous effects, forgetting that the difference in their constitutions and education makes it impossible for them to perform, with ease and advantage, feats such as the boys or young men can perform. Exercise or excitement, however intrinsically pleasurable, if continued after we have become fatigued, is no longer bene-

ficial, and may become positively harmful. Our sensations are our best and truest guides. When the eyes and head ache from the effort of looking through a picture gallery, do not insist on seeing the remainder of the pictures; go home and lie down. When the brain is giddy with sunlight and the warm sea-side air, do not say, "I must stay out till dinner"; go indoors, draw down the blinds, and take a nap, and let the children do so as well. When tired with walking, cycling, swimming, rowing, or any other form of amusement, do not say, "I must do so much more"; give over and take a rest.

The adherence to a programme, which people are so apt to enforce upon themselves, in spite of their feelings, does harm and not good. Sight-seeing or exercise continued after we have become fatigued is no longer beneficial, and if we wish to gain or preserve health we must yield to the warnings which Nature provides in our bodily sensations.

Meals should be taken regularly, and a perfect rest for at least half an hour before and after them should be indulged in. The hours of sleep should be long, and we should take the opportunity, so rare for us poor slaves of fashion, to go to bed in reasonable time—say about ten o'clock, and sleep till seven. If the country air should make one hungry before the appointed time for a meal, as often happens, it is not well to insist upon waiting, but it is wise to take something while the appetite lasts. Those who are unaccustomed to active exercise should begin gently to increase the amount, so as not to become over-fatigued. Thus, a lady who cycles for the first time is tired after riding a mile or two, but by gradually increasing the amount, she will after a few weeks be able to cycle for twenty miles without feeling fatigue; and the same is true of walking, riding, or any other country pleasure. A greatly increased amount of open-air exercise is very beneficial, but any sudden strain put on the system is injurious. To make a long story of advice short, I will con-

clude by saying: Eat when you are hungry, drink when you are thirsty, rest when you are tired, do not overheat yourself, and when hot do not sit where you can get a chill; do not make a toil of pleasure, but take everything easily.

Wisely taken, our holidays should not prove a disappointment, but we should return from them full of strength and good spirits to face the work and possible trials of the time to come.

CHAPTER XV

INFECTIOUS DISEASES AND HOW TO PREVENT THEIR SPREAD

With an increasing knowledge of the origin of infectious diseases, and the mode in which they are developed, there should be a corresponding decrease in the number of their victims, for knowing the method of the enemy's attack, we should be prepared to resist it. The arms of science are, however, weakened by two chief causes, which pervade every rank of society—these are carelessness among those who should know, and bigoted ignorance among the lower classes. There are people who are careful enough to avoid infectious diseases for themselves and families, but who when, by some accident, such a disease gets into their houses, cease all precautions, not caring in the least who may become infected through their agency. People such as these, moving in good society, will frequently conceal the fact of infection, so that they may go about and enjoy themselves as usual; they will permit their friends to visit at their houses, and let them go away carrying with them the seeds of disease, and perhaps of death. A young lady I know went to a ball, in spite of the fact that her brother was ill with small-pox, and that she fainted twice during her toilet. The next day small-pox was pronounced in her case, but it is hardly possible to know how many of her partners and acquaintances she may have infected. Unprincipled people of this sort will send their

children, not yet stricken down, but perhaps already infected, to school, where they spread the infection broadcast. They send infected clothing to the laundress without informing her that it is infected, and thus risk conveying the disease to her washerwomen and customers. They exchange books, which have been read by the patient, at public libraries. They allow convalescent patients to travel by rail, and lodge in apartments, the next tenants of which may fall victims to the hidden danger. A gentleman friend of mine was travelling from London to Edinburgh. At one of the intermediate stations a girl, evidently in delicate health, got into the carriage, and the people who accompanied her requested that the window should be closed, as she was recovering from a severe illness. The gentleman unfortunately complied with this request, and finished his journey in the carriage with the invalid. A few days after he was taken ill with scarlet fever.

Legal punishment for those who commit these crimes of exposing their fellow-creatures to disease and possible death should certainly be enforced, but there are others who sin more through ignorance or from harsh necessity. Such is the poor tailoress who stitched at her work in a room containing a small-pox patient, and sent home to her employer garments which had actually been laid over the sufferer to keep him warm. Again, infected clothes are often pawned by the poor, and thus the pawn-shop may become a centre of infection.

Clothes belonging to those who die of infectious diseases are sometimes treasured up, thus forming a source of disaster to the living. A young Scotch servant girl died of scarlet fever in her "place." Her clothes were carefully packed up, and the wooden box containing them sent home to her native village. It arrived at the station, but as there was a difficulty in getting it to its destination, it remained there for some days waiting until fetched. Meanwhile the station-master's children played upon it, and in due time fell ill

with scarlet fever. At last the box was taken home, when its contents were liberally distributed among the relations and friends of the deceased. An outbreak of scarlet fever in the village was the result, and the station, of course, became a centre for the further diffusion of the disease.

We frequently hear of cases of diseases of which the origin is hidden in obscurity, and which some are inclined to call spontaneous eases; but when we consider the gross carelessness and wicked concealment so frequent among all elasses, it seems unnecessary to attribute them to supernatural causes. There is a saying of the old Hebrew Fathers, "Do not seek for the cause of anything in signs and wonders when you may find it in the way of all the earth"; and this is especially applicable in the present instance, for cases, the origin of which is at first sight mysterious, on close investigation are generally found to have arisen from some simple cause. For example, a considerable number of cases in a reeent epidemic of small-pox at Islington were traced to a potman in a small public-house, who continued to carry round the beer to neighbouring houses and to serve customers while actually suffering from the disease; and in the *Telegraph* some time back a case was reported under the pregnant heading of "How Disease is Spread," in which a father was fined forty shillings and eosts for exposing his son while suffering from small-pox. A creel owned by the father arrived at Hull towards the end of October with the boy, then suffering from the disease, on board. The child was then taken to a public-house, not being removed into a hospital till the end of November, but being exposed at various places along the river Trent, at many of which the disease spread, one case ending fatally, and twelve others being admitted into the Hull Fever Hospital.

Many cases of criminal carelessness with regard to infectious diseases have come under my personal notice. For instance, in one case the manager of a large provincial drapery shop had his daughter sick with searlet fever in the

business house, and alternately visited her and attended to customers; while in another case a small-pox patient was nursed in one of the rooms over a large west-end grocery establishment. Worse still, the headmaster of a large school in London had his son, who was ill with small-pox, nursed in the house, where a large number of children came daily to study, carefully concealing the nature of the boy's disease. Again, two servants entered a family, and some eight days afterwards one of its members fell ill with scarlet fever, the origin of which was quite mysterious. It did not, however, long remain so, for, on ascertaining the nature of the disease, the two servants decamped, and after some inquiry it was discovered that they had come to their new "place" straight from the fever hospital. This is an example which should be taken to heart by ladies in search of servants; and they should be careful not only to have a clean bill of health with the newcomer, but also to be sure there has been no infectious disease recently in the house from which he or she comes.

The carelessness of nursemaids is a source of great danger to their young charges, for, if one of the nurse's family or friends is ill, she will not uncommonly take her mistress's children with her to inquire after the sufferer. Doctors, when visiting cases of measles, scarlet fever, whooping-cough, and even small-pox, diphtheria, and typhus, in the back streets, slums, and courts of our great cities, too frequently see perambulators and elegantly-dressed children waiting about the lower part of the house, while the nurses are upstairs visiting the patient.

Sometimes even the children are taken upstairs, and if old enough to talk, are bribed or threatened into silence as to where they have been. A friend of mine told me that when she was a child, her nurse took her into some horrible house where she was much frightened, and when they were going home, this wicked creature told her that if ever she said a word as to where she had been taken, she (the nurse) would

come in the night with a carving-knife and cut out her tongue, and cut her inside out. Fancy the poor child's terror afterwards, which she has never forgotten to the present time, though now a middle-aged woman. My experience of servants, as a rule, is, that they can barely be trusted even as far as we can see them, and the less children are left to their tender mercies the better. When children can speak they should always be carefully sounded as to where they have been taken for a walk, and hesitation to tell, or any appearance of fear, should be looked upon as necessitating a full explanation. If the habit of threatening is discovered the nurse must be dismissed.

On a Sunday out, too, the nurse will go and sit for hours with her suffering relative or friend, and will return, perhaps, in time to put the little ones to bed, and impart the seeds of a disease which, to the parents, will appear wholly inexplicable. Against this second contingency mothers can hardly guard, but in the former case they can insist that the children are not taken far from home in their walks, and by skilful questioning of elder children they can find out whether these orders have been obeyed.

But, on the other hand, mistresses are not wholly blameless towards the servants, for quite recently a friend of mine who happened to be in a registry office for servants, heard a lady severely reprimand the keeper of the office because he had informed a girl she was about engaging that the lady had measles in her house. The man deserved honour rather than blame for his conduct in not allowing that girl to run blindfold into danger. The rich, moreover, are quite as wrong in cases like this, to attempt to bring the poor into the range of infection, as the poor are in wantonly risking the health of their employers.

Errors in diagnosis on the part of medical men are also a cause of the spread of infectious disease. A case in point was told me by my friend Dr. Campbell. One day when he was lecturing to his class on skin diseases, the hospital porter

came with a note, saying that a patient was waiting to be seen who had been sent up by a country doctor as an interesting and obscure case. The patient was told to come in, but was hardly inside the door when the doctor called to him to stop, and turning to his class said, "How do you diagnose this?" "Erythema," "Erysipelas," "General acute Eczema," etc., called out the young men. "No, gentlemen, it is *small-pox*. I could *smell* it before he was well into the room."

Now, this man had come up from the country by train, been taken to a lodging-house, come to the hospital by omnibus, and waited in a room full of non-infectious cases, so it is impossible to say how many people may have been infected owing to this mistake of a medical man.

A converse case came under my notice. A gentleman living in a fashionable boarding-house felt feverish and unwell, and sent for a doctor. He declares that there were not more than six pustules upon his person, but the doctor diagnosed his case as small-pox; an ambulance was sent for, which, instead of coming at night, as was desired, came in the middle of the day, thus seriously injuring the landlady's business, and he was taken to a small-pox hospital. On his arrival he overheard some conversation to the effect that his case was doubtful, but the doctor finally said: "Well, never mind, send him in." He was then confined for several weeks in a ward with about twenty cases of small-pox, one dying and others in a raving delirium, one of the latter one day falling across his bed; but no symptoms of the disease developed in him, and he was assured by the nurses that he never had it. The horrors of this forced and unwarrantable imprisonment, in a ward overcrowded with cases of one of the most loathsome diseases under the sun, have left their impress on him for life.

Wrong diagnosis of infectious cases may often arise from the fact that, in order to take a medical qualification it was not necessary until quite recently that there should have been any previous study at a fever hospital. All the examining bodies now, however, require a residence in a fever hospital.

The old system of apprenticeship was distinctly better in this aspect than the modern system of training, as it gave an insight into all cases of general practice.

Another presumable cause of wrong diagnosis is the fact that, as a general rule, infectious diseases do not attack the same person more than once. There are, however, very many exceptions to this rule. Thus, my elder brother had measles when a child, and when grown up was taken ill with a complaint which our family doctor said was measles. He was properly isolated, but by the end of a week was well enough to go to visit his own doctor, a celebrated surgeon. This gentleman took upon himself to "pooh-pooh" the diagnosis previously made, and said my brother might mix with the rest of the family. Fourteen days later my younger brother developed measles, and fourteen days after that I fell ill myself with the complaint. Nor have I ever forgiven my brother's doctor for his interference, which, as I was at the time on the point of going in for an examination, threw me back a year in my studies, and altered the whole course of my life. It is indeed difficult to estimate the ultimate results of such cases as I have quoted, and, if a medical man is in doubt, it is his duty at any rate to play for safety. When there is any suspicion that a case is likely to be infectious, it is best to send for an old general practitioner who must have seen many such. A tendency to take infectious diseases is an idiosyncrasy in some families, and this should be remembered. When my younger brother had measles severely for the second time, and three medical men of standing were called in, two of them would not say that it was not small-pox, and the third refused to pronounce an opinion, because, as he told me afterwards, he "did not wish to contradict the other two, and the matter was bound to clear itself up in a few days." Of all concerned, only the hospital nurse stoutly maintained that the disease was measles, and well do I remember the agony of mind which the whole family suffered until the sequel showed her to be right. Thus both of my

brothers had measles twice, and a sister also was similarly affected. Speaking of this tendency, Dr. Corfield, under whom I was at the time studying, once mentioned the case of a medical friend of his who had had small-pox *three* times, and was convinced that if called to another case of the disease he would get it again. Dr. Aitken, in his work on *Medicine*, writes:—"In some few instances even a second attack has no protective influence. Dr. Roupel says he met with an instance in which small-pox occurred three times in the same person. The lady of a Mr. Guinnett had it five times. Dr. Matson speaks of a lady who had it seven times; while Dr. Baron mentions a surgeon of the South Gloucestershire Militia who was so susceptible that he took small-pox every time he attended a patient labouring under that disease."

Another great public danger is the travelling of those who have visited infectious patients, or, still worse, of the patients themselves, in public conveyances. A short time ago two women visited the corpse of a lady who died of small-pox. The good sisters who had attended the deceased urged them to take precautions against the spread of the disease; it was only by main force, however, that they prevented them from taking with them a bundle of the dead woman's infected clothing, and, in spite of earnest remonstrance, they both insisted on returning home in an omnibus. Nor is it long since a man with eruption of small-pox actually out on him was refused admission into a London hospital on the plea of want of room, and was allowed to go away and travel by rail to a village, where there have since been six cases of this disease and two deaths from it; and it is impossible to say how many people he infected during his journey.

To move patients too soon is also a cause of the spread of infection, and many people are wicked enough to take children away to the sea-side into lodgings when there is really fear that they will communicate disease to others. It is well for me to make known the fact that if a fever patient is moved while the infection is on him, and others who

have not been told of it suffer harm, a civil action for damages may be brought against those who have imported the disease into the house. Such actions have frequently been brought and heavy damages recovered.

It is also well for the general public to know that under the provisions of the Public Health Act 1875, any person who knowingly lets for hire any house, room, or part of a house in which any person has been suffering from any dangerous infectious disorder, without having such house, room, etc., and all articles therein liable to retain infection, duly disinfected to the satisfaction of a legally qualified medical practitioner (to be testified by a certificate signed by him), is liable to a penalty not exceeding Twenty pounds. For the purpose of this provision, an innkeeper is to be deemed to let part of a house to any person admitted as a guest into his inn. The Act goes on to provide that any person letting for hire, or showing for that purpose, any house, or part of a house, who, on being questioned by any person negotiating for the hire of such house, or part of a house, as to the fact of there being, or within six months previously having been, any person therein suffering from any dangerous infectious disorder, knowingly gives a false answer to such question, shall be liable, at the discretion of the Court, to a penalty not exceeding Twenty pounds, or to imprisonment, with or without hard labour, for a period not exceeding one month.

While all possible precautions should be taken against coming in contact with infected persons or visiting infected places, people should not go about with a fixed fear of infection, and make their lives miserable about it. It is a proven fact that fear of a disease renders the individual far more liable to an attack than other people. Young children and those whose general health is impaired are also more liable than others. Hence especial care should be taken to improve the general health, and to keep the little ones from risk of infection; and as a preventive measure

some good disinfectant, such as Sanitas both in liquid and powder, should be used freely about the house. It is a great mistake to think that every child is bound to have measles and scarlet fever, or "scarlatina," as it is more commonly called, and they should, if possible, be kept from taking these diseases, which are far more fatal to them than to adults. If the diseases come later when they have grown up, they are so much the more able to bear them, but very many escape altogether. I regard as positively sinful the common custom, according to which, when one child in a family is attacked, other healthy children are placed in the same room, "so that they may all get over it at once."

Among the poorer classes, sufferers from infectious diseases should at once be conveyed, in ambulances kept for the purpose, to special hospitals; and it ought to be the care of the Local Government Board that there should be sufficient hospital accommodation even during epidemics. The Compulsory Notification of Disease Act ought to be of inestimable value in this respect, and it should be rigidly enforced, whether the sufferers be poor or rich. In the latter case, however, good and skilled nursing can be obtained at home, and with proper precautions there need be no fear of the infection spreading.

When it is decided that an infectious case shall be nursed in the home, good and skilful nursing is of course a *sine qua non*. The sufferer should be isolated in a room at the top of the house, to which only the nurse and the doctor have access. From this room all carpets, curtains, and upholstered furniture should be removed, so as to have as few things as possible that can harbour the germs of disease. The use of disinfectants now becomes a very important matter. It is desirable to use a disinfectant which is prepared in fluids, powder, and soaps, as two kinds of disinfectant must never be used at a time, since the chemical action taking place between them often renders both useless. For all purposes one cannot do better than use the "Sanitas" disinfectant pre-

parations, using the scrubbing soap for the floor, and for cleansing clothes and utensils, the toilet soap for the nurse's and patient's ablutions, the powder to scatter about the house and disinfect the patient's excretions, and the fluid for other purposes. These preparations cover the whole range necessary, are pleasant in odour, non-poisonous, and do not stain linen, while they destroy all germs of disease. Over the door of the sick-room a sheet must be nailed, the end of which lies in a bath of the disinfectant fluid, so that the sheet is always wet. This forms an effective barrier to prevent the spread of disease germs over the house. Throughout the illness nothing must pass out of the sick-room without being previously disinfected, and all remains of food and the like must be burnt. Cats and other animals act as mediums of infection, and must not be allowed to enter the room.

Thoughtless acts prompted by love may become a source of trouble, as in the following case. One child in a family was taken ill with measles, and the others were all sent away from home; but the loving mother wrote a letter to them from the sick-room, and by means of this they also were infected. Moreover, people should not allow themselves to be led by affection, or any other motive whatever, to permit the convalescent to mix with others until the medical man in attendance shall pronounce that there is no longer any danger of infection.

Nurses, and those who run the risk of infection, should take frequent warm baths, washing the whole body and head with disinfectant soap; they should be regular in their diet and hours of sleep, for it is most important that their health be not allowed to fail. Before entering the ward of a fever hospital each visitor is entirely covered with a veil of antiseptic gauze, which is removed on leaving, and this precaution is also advisable in private cases. After the convalescence or death of a patient, the room should be thoroughly disinfected and the paper scraped off the walls and burnt, together with such articles as cannot be otherwise disinfected.

Very great care must be taken in this respect, as from some little article which has been overlooked, the disease may break out again even after a considerable lapse of time. A doll which had been played with by a child suffering from diphtheria, was after some months given to another little girl, who took the disease and also died of it. A dressing-gown which had been worn by a scarlet-fever patient, after having been shut up in a drawer for more than a year, communicated the disease to another wearer. All clothing should be submitted to the action of heat or sulphur fumes, or burnt. Relics of the dead ought not to be kept as a source of danger to the living; and no letters should be allowed to pass from the sick-room to the post office or to other persons. Patients from scarlet fever, when convalescent, should have several baths, in which the Sanitas soap is used, special care being taken to disinfect the hair. Desquamation, or "peeling," may be assisted by frequent greasing of the whole person with Sanitas Cream, which also prevents the particles of skin from flying about. No convalescent should be allowed to mix with others until desquamation has been accomplished, a number of disinfectant baths have been taken, all inflammation of the throat has disappeared, and the temperature as shown by the clinical thermometer has been reduced to the normal 98·5 Fahr. About six weeks is generally long enough for quarantine, but no hard-and-fast rule can be laid down.

During all outbreaks of infectious disease it is most important to see that the cisterns and water-butts are clean and the water-supply beyond suspicion. All drinking water should either be twice boiled and drunk within a few hours, as described on p. 193, or else passed through a Pasteur filter, which is impervious to all disease germs. Ordinary filters are worse than useless, and give it a false sense of security.

Drains should be daily flushed with water containing disinfectant, and the traps of closets, urinals, fixed basins, and sinks should be examined to see that they are in working

order, as described in the chapter on drainage; all should be well scrubbed and cleansed with disinfectant soap and water. Sanitas Powder should be sprinkled over dust-bins twice daily.

Ventilation must be carefully attended to, especially in the sick-room, where, however, it is necessary to avoid draughts. Disinfectant solution should be kept in a soup-plate under the bed, in the vessel used for the patient to spit into, and in the chambers. The Sanitas Disinfecting Fumigator should be used, which is very valuable in preventing the spread of infection, and also to relieve the patient when the throat or lungs are affected. In diphtheria it is of especial value. From our illustration (Fig. 28) it may be seen that the fumigator is very easy to use. The patient should use, instead of handkerchiefs, pieces of rag, which can be burnt after use. Before sending articles from the sick-room to the laundress, they must be soaked for two hours in a tub of Sanitas and water, and cloth clothes, bedding, and all other articles which have been in the patient's room, should be disinfected first in the room—when fumigated by the parish authority—and then in the public disinfectant ovens. Either the doctor or some member of the family should communicate with the Medical Officer of Health at the vestry before the patient is to be removed, stating when the room will be ready for fumigation. Without calling in the aid of the vestry, however, which many people object to do, it is very easy for any nurse or member of the household to fumigate the room thoroughly and effectually by means of Kingzett's Sulphur Fumigating Candles, in which the difficulties ordinarily associated with burning sulphur or fumigators are overcome, a powerful oxidising agent which ensures more perfect com-

FIG. 28.

bustion being combined with the sulphur. The candle, as shown in our illustration, has an outer casing between which and the inner one water is placed, thus rendering it perfectly safe. The water also serves another useful purpose, as it vaporises and condenses on the various objects in the room, thus bringing the sulphurous acid, which is soluble in water,

Fig. 29.

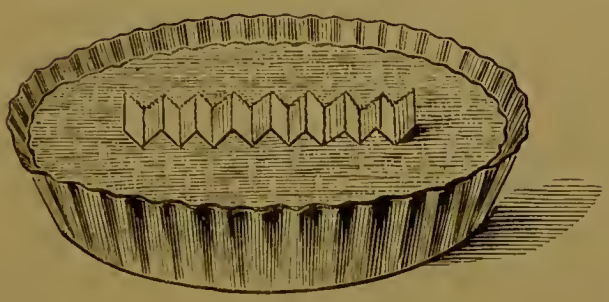

Fig. 30.

into actual contact with the articles to be disinfected. The windows, keyholes, and other apertures of the room should be closed, the candle placed in a little water in a wash-hand basin in the centre of the room, and the nurse should then apply a light to the cone of the candle and leave the room, closing the door and hanging a sheet over it to prevent the escape of any of the gas into the house. The candle burns

for two or three hours; but it is best not to open the room till next morning, when the windows should be thrown wide open. The walls should afterwards be scraped and repapered, and the ceiling whitewashed.

In case of death no one should be allowed to see the body, and as few persons as possible should be employed about it. A very sad case of neglect of this rule has come under my notice in the person of a servant, who, although forbidden to do so, entered the chamber of death to look the last on the body of her master, who had died of small-pox. She caught the disease and died of it. The body should be placed in a coffin filled up with chloride of lime, and the funeral should be conducted as privately as possible. I read some time since an account of the funeral of a school-mistress who died of scarlet fever. She was followed to the grave by sixty of her school children, many of whom, doubtless, did not escape the infection. In the case of infectious diseases, health reformers should be especially anxious to see cremation become compulsory, for fire is the best of all disinfectants, and effectually disposes of the germs which may live on in the bodies of the buried to infect the living. In the case of death from infectious diseases, the strongest objection against that most sanitary and desirable practice, cremation, viz. that it would render difficult the detection of murder by poison, is practically valueless.

After any risk of infection quarantine should be enforced, and as a guide to the period required, the Medical Officers of Schools' Association has fixed the following quarantine times after exposure to infection, provided thorough disinfection of all clothes and belongings of the person by washing with disinfectant soap be carried out before the pupils return to school:—Diphtheria, twelve days; scarlet fever, fourteen days; measles, sixteen days; German measles (roseola), sixteen days; chicken-pox, eighteen days; small-pox, eighteen days; mumps, twenty-four days; whooping-cough, twenty-one days. Instances of cases of scarlet fever are, however, not uncommon

after fifteen days from the time of infection, so that it would be as well to lengthen the period for that disease.

When there has been any chance of exposure to infection, children should be carefully watched for symptoms of the disease. Headache, with sickness, or sore throat, heat and dryness of the skin, and even severe catarrh, should be the signal for separating the little sufferer from other children; but, after the times mentioned above, children may be considered safe.

The Medical Officers of Schools' Association has fixed the times at which it may be considered safe for convalescents from infectious diseases to mix with others as follows:— After scarlet fever, not less than six weeks, if desquamation, the peeling of the skin, have completely ceased, and there is no sore throat. After measles, three weeks from the date of the appearance of the rash, if all desquamation and cough have ceased. German measles, two or three weeks. Small-pox and chicken-pox, not till every scab has fallen off. Mumps, four weeks from the commencement, if all swelling has subsided. Whooping-cough, six weeks from the commencement of whooping, if at that time the spasmodic cough and whooping have ceased, or earlier if all cough has disappeared. Diphtheria, not less than three weeks if convalescence is complete, and there is no sore throat nor discharge of any kind. Cases of contagious ophthalmia should be isolated until a month after all discharge from the eyes has ceased, and the inner surfaces of the eyelids are free from granulations.

The poisons of scarlet fever and of typhoid fever are frequently conveyed by milk, and this is a source of danger which is very often overlooked even by medical men.

Milk brought to town by night-trains in cans is taken by the retailers to their own shops, where it often remains for five or six hours before they distribute it. Their premises are often dirty little shops, where the milk is stored near rooms in which the families live, and may be contaminated by sewer-gas or the poison of specific fevers. Even the

washing of cans with dirty water may render milk poisonous. Just as water will carry the germs of cholera and typhoid fever, so will milk; and it even appears, owing to its organic constituents, to serve as a hot-bed for the development and multiplication of disease germs. Milk absorbs with great facility odours and gases to which it is exposed, as, for example, the odours of turpentine, coal-gas, musk, and poisonous matters are readily absorbed by it, contamination being also occasioned by the exposure of milk-cans in the street, and the dipping of hands into them consequent on ladling out the supply.

The poison of typhoid fever has also been communicated to milk by an open grating placed over a drain-inlet in the place where the cans were kept. Epidemics of typhoid fever, cholera, diphtheria, and scarlet fever have been traced to milk as the medium conveying infection; hence, in all periods of epidemics, the milk should be scalded for the purpose of destroying the germs of disease.

Important rules for the proprietors of dairies are that:—(1) The cow-houses should be kept clean and thoroughly drained. (2) The cows should have a good supply of pure water to drink. (3) The udders should be kept perfectly clean by sponging with warm water before milking. (4) The cows should be inspected frequently to ascertain that they are perfectly free from disease. (5) Cows suffering from any disease whatever should not be used for milking purposes.

Such diseases of the cow as foot-and-mouth disease and tuberculosis are readily transmitted to man, and I have reason to believe that typhoid fever, although not as such a bovine disease, may be originated from the cow. A curious case was told me by a medical friend who was travelling in Africa, far from sources of human infection, in which disease of the cattle appeared to have been the origin of several cases of typhoid fever in the encampment.

Dr. Klein, who advocates the necessity of always boiling the milk, says he has found that to heat the milk up to 185°

Fahr. is quite sufficient to destroy the vitality of the microbes of scarlet fever. To keep it at a temperature of 180° Fahr. will, he thinks, sterilise cream and not impair its nutritive value. Most doctors hold that milk for children's use should always be scalded or boiled, but it seems occasionally that this causes it to disagree and frequently to produce constipation; and if this is so—if every precaution is taken in obtaining the milk from a good dairy—it need only be boiled in periods of epidemic. The fact that thick scum has to be taken from milk which has been scalded and allowed to get cold, does not, we are told, deprive it of much of its nutritive value; the loss of albumen is said to be trivial, and the rising of this scum can be to a great extent prevented by well stirring the milk occasionally, when it is put in the pan after boiling, while it is cooling, which lasts from ten to twenty minutes.

What is true with regard to the transmission of infection by milk also holds good with regard to cheese, cream, and butter, but not with regard to condensed milk, which, by the heat used in course of preparation, is effectually sterilised. A very interesting instance is a case cited in the reports of the Medical Officers of the Privy Council and Local Government Board, 1876, vii. 72. "On June 9th, 1875, a dinner-party was given at a house in South Kensington, twelve guests sitting down to dinner with the host and hostess, their eldest son and daughter. In the evening these sixteen persons, together with their other son and daughter, and some 150 other guests, assembled in the drawing-rooms. On this day the seven servants of the house were reinforced by seven others. Between June 11th and 14th there fell ill of scarlatina, or sore throat, four out of seven of the family who were in the house on June 9th, three of the seven servants, six of the twelve dinner guests, four of the evening guests, one of the occasional servants, and a lady who came to lunch the next day (the 10th). Ample and exhaustive inquiry into the antecedent circumstances as to scarlatina in

the district gave no clue to the outbreak. There was but little scarlatina in the neighbourhood, and, except for meeting at this particular house, no common centre of infection or other common local circumstance to account in any degree for the disease attacking these particular persons. The *only* circumstances that afforded any clue to the origin of these attacks was the *cream* supply, which came exceptionally from a London dairy. Of the family and dinner guests who were afterwards taken ill, all had partaken of *cream* in one form or another; while of those who were not taken ill, a majority had not used *cream* in any form."

The most careful supervision of the milk-supply is therefore of great importance both from the point of view of personal and public health. As a general rule it is safer to buy milk from a large firm than from small retailers, because the large dealer has a reputation to lose, and also can afford to be more particular in choosing his sources of supply, and in storage. Moreover, he can only cheat through his servants, and renders himself open to exposure by them. It would be well, indeed, if large dealers all over the world were to follow the example of one English company, viz., the Aylesbury Dairy Company, as regards the exhaustive system whereby it safeguards the public against receiving milk not of standard quality, and against infection.

The system comprises :—(*a*) The inspection and survey of farms by the local medical officer of health *before* supplies are sent to the Company; (*b*) The analysis of the water used in the dairy of the farm also *before* supplies are sent; (*c*) The constant supervision by frequent personal inspection of the farms, and the persons resident and employed upon them, by the medical officers of health, and the enforcement of rigid sanitary precautions; (*d*) Extensive buildings at St. Petersburgh Place, Bayswater, especially devised for the reception and distribution of milk, particular attention being given in their arrangement to the drainage and water-supply; (*e*) The constant medical supervision by the London medical officer

of the Company; (*f*) Delivery by special service to houses of customers in which cases of an infectious nature exist, and the separate cleansing and disinfection of the cans used in supplying such houses; (*g*) The maintenance of an experienced analyst and staff, with properly-equipped laboratory and testing rooms for sampling the milk—(1) on its arrival at the dairy, (2) on its despatch from the dairy, (3) on the return to the dairy of what is left after the carts have distributed the milk to customers, thus ensuring the absolute purity of the milk.

The medical and sanitary regulations referring to the farms whence the milk-supply is drawn are very stringent, and only about one in four of the farms that apply to the Company are passed for the purchase of milk.

When it is found necessary to take on a new supply of milk, such supply is always purchased on the condition that the farm premises and general surroundings, and all sanitary arrangements, are satisfactorily reported upon by the local medical officer of health, and that the water used in the dairy is passed by the Company's analyst. The medical officer of health for the district in which the farm is situated is communicated with, and asked to inspect the farm and report upon it as to the water-supply, sanitation, health of the residents and workpeople, and of the surrounding neighbourhood; also to state whether he considers all the arrangements satisfactory, and whether the occupier understands the responsibility, and is, in his opinion, likely to observe the regulations set forth in the contract entered upon, of which a copy is sent for his perusal.

Upon a satisfactory report being received from the local authority, the Company's resident analyst proceeds to examine the sample or samples of water which have been taken by the medical officer of health, and if his report is also satisfactory, the farmer is communicated with, and permission given for the supply of milk to commence; but it may here be remarked that few farms are found with a water-

supply which comes up to the Company's standard of purity, and that many have to be either entirely rejected in consequence, or a satisfactory water-supply provided.

Satisfactory reports having been received, the medical officer of health is again communicated with, and his services are retained to make at least one inspection monthly, and report as to

(1) The health of the inmates of the farmhouse;

(2) The health of workpeople and their families;

(3) The health of the surrounding neighbourhood;

(4) The sanitary condition of premises, etc.; and in any case of infectious sickness, however slight, which may occur upon or near any farm in the district from which the Company draws a supply of milk, he is asked to make special visits and reports, and to take whatever steps he may consider advisable to safeguard the public, at the expense of the Company.

In order to prevent the possibility of any deception on the part of the farmer, through it being against his interest to report cases of infectious disease, payment is made during the continuance of such disease, when the supply of milk to the Company is stopped by the local medical officer, just the same as if the milk were still taken. Also, when an employé of the Company is suffering from an infectious disease, or there is any such disease in his family, he is suspended from work, but his wages are paid, just as if he were employed as usual.

The history of all infectious cases is kept in separate books, and these contain such entries as cases of disease in milk-carriers, in farmers, in the houses where carriers are living, or in the houses of customers. As in supplying milk to some 7000 houses it stands as a matter of course that cases of sickness exist in some of these houses, the Company's servants have strict orders to find out as far as they can when such cases of sickness exist, and to report the same, when the regulation mentioned above is at once acted upon.

When such disease is discovered, the house is served specially—that is to say, a special messenger brings the milk in a sealed can, and takes away the empty can, which is brought to an outhouse and never allowed to be in contact with the cans used for other customers. This is a very important matter, as otherwise sickness may be conveyed from one customer to another.

Should a case of contagious or infectious disease occur in a house in which any person in the employ of the Company lives, arrangements are made, at the Company's expense, for providing lodging and accommodation out of the house. Should any case of sickness whatever, no matter how slight, exist in any house or dwelling belonging to the Company, the person to whom such house is let, or given rent free, must at once report the same to the secretary, and take his instructions thereon.

The whole of the employés, and also the premises of the Company, are under the supervision of medical officers, whose services are retained by the Company.

As doctors seem to disagree whether influenza is an infectious disease, the Company has determined to be on the safe side, and during the last two years the milk has been served specially to all houses where influenza was found.

Now, of course, all this entails great expense, and places a firm that is under such strict and conscientious management at a considerable commercial disadvantage; but were similar precautions taken universally in every branch of commerce, such a disadvantage would cease to exist, and epidemics would be practically stamped out.

I can hardly quit the subject of infectious diseases without saying something on the vexed question of *vaccination*. Personally, I am a strong supporter of this, which I consider one of the most valuable preventive measures possible; and I think a striking proof of the utility of vaccination has been afforded by the reports on infectious diseases of the years 1892–93. In each year there have been certain cases of

small-pox, and an epidemic threatened, but did not really arise, while at the same time, although beginning of course with a few cases, scarlet fever assumed epidemic proportions, and raged for many months. Now, my contention is that had it not been for vaccination, small-pox would have spread in the same way as scarlet fever did, as the climatic and other conditions of the years were similarly favourable to both diseases. It must, I think, be the hope of all who take an interest in scientific medicine, that as our knowledge of bacteriology increases, and we can isolate the germs of various infectious diseases, it will be possible to produce attenuated virus and to inoculate for other diseases as well as small-pox. Of course, important series of experiments would have to be performed before such a thing were possible, but I see no reason why it should not be eventually attained.

The objections raised against vaccination are, I think, trifling in proportion to the immense amount of good it does; and so firmly am I convinced of its value that I have been vaccinated no less than three times myself, and always urge re-vaccination whenever there is small-pox about. Of course the most important objection raised by the anti-vaccinators is the possibility of introducing specific diseases when human lymph is used; but to this I reply that it is not at all necessary to use human lymph, as the very best results are now obtained by using properly-prepared calf lymph.

In the cases of my own infant, and the infants of several medical friends of mine, emulsified calf lymph was procured from Berlin through the agency at 11 Adam Street, Adelphi; and in all the cases I have known the vaccination ran a very easy course, there being in the case of my own child only one day's fever, and three marks out of four taking satisfactorily. I may mention that she had previously been vaccinated with human lymph, which had not "taken." Emulsified calf lymph is very cheap, costing only one shilling per tube, and being hermetically sealed, can be sent by post all over the

world. It has been used satisfactorily by correspondents of mine in India, where small-pox is sporadic and vaccination doubly necessary.

The precautions to be observed in vaccination are the following:—(1) The child should be in good health at the time of vaccination; (2) The skin should be carefully washed, and the lancet or darning needle rendered antiseptic by passing it through the flame of a spirit lamp; (3) The scratches should be protected by antiseptic gauze; and (4) No friction of clothing should be allowed.

I would urge upon all mothers to have their infants vaccinated upon the outside of the calf of the left leg, as by this means they not only avoid disfigurement in the case of girls, but also render it much more easy for the child to be nursed, as when long sleeves are worn, as advised in my chapter on clothing, it would be necessary to alter all these while the infant is suffering from vaccination. Moreover, it is much more easy to avoid rubbing the leg of a small infant than it is to prevent friction to the arm. I would urge my readers not to be led astray by the outcry of the anti-vaccinationists, who are, for the most part, illiterate people who are absolutely ignorant of what they are talking about, and cannot even express their fallacies in grammatical English.

It is the duty of parents towards their children and towards the State to seek the protection which vaccination undoubtedly affords.

In the case of all contagious and infectious diseases, except perhaps influenza, we have an absolute knowledge of the manner in which they spread, and it is therefore the duty of every citizen to do his utmost to stay their development; while ever in influenza I have no hesitation in asserting that the disease certainly spreads by contagion and infection, although it may be favoured by climatic conditions.

If rational care were only to replace the unreasoning recklessness of health and human life which now so largely

prevails in every rank of society, science would be able to do much towards diminishing the number and violence of "the thousand natural shocks that flesh is heir to." All she asks is that her behests shall be obeyed, and that stumbling-blocks shall not be placed by ignorance in her path towards higher things.

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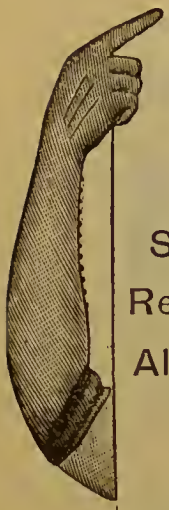

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